May, 1946 Vol. 35, No. 5

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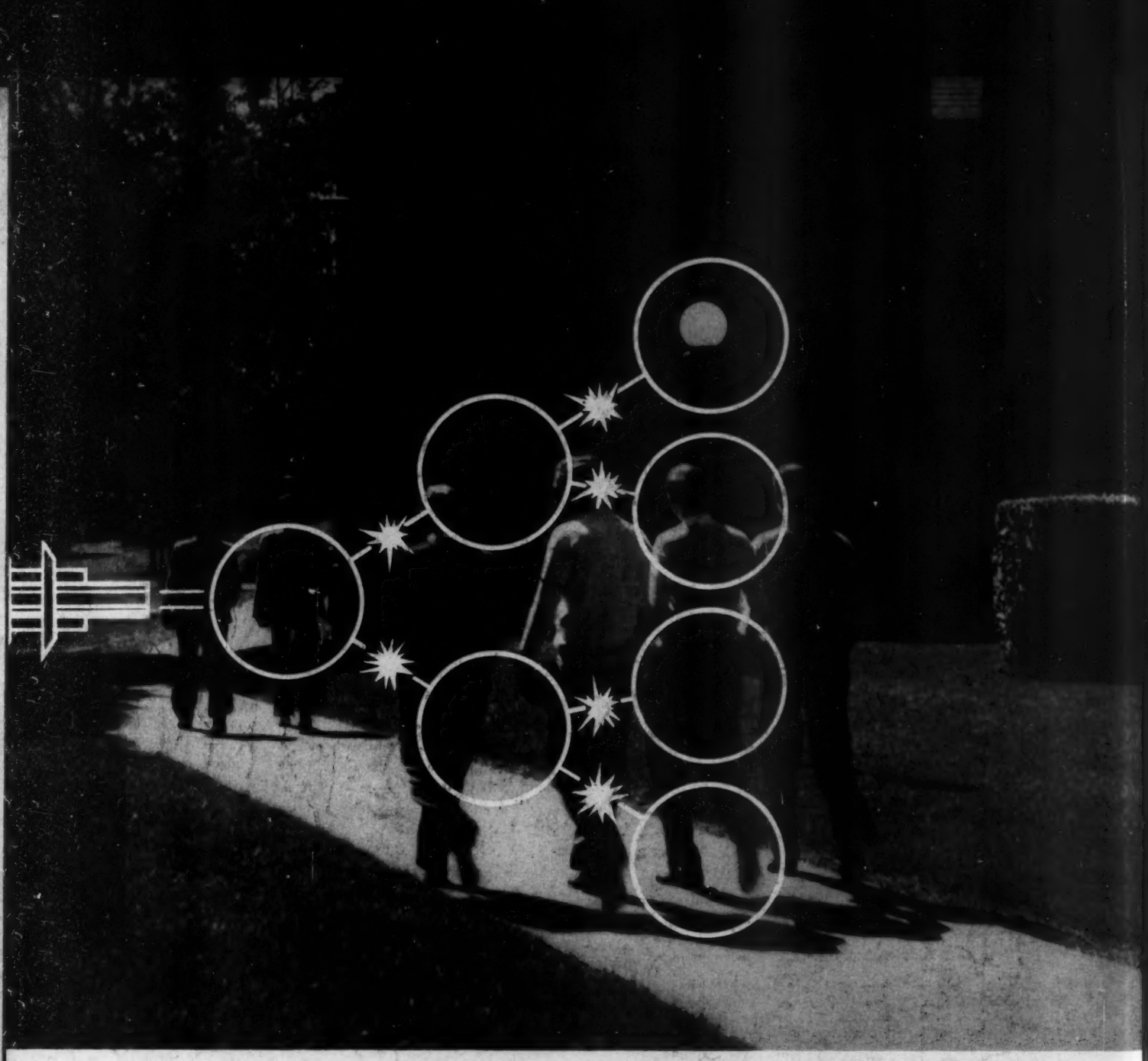
INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

REQUISITION NUMBER



The Lesson of the Atom

Mankind has always been profligate in its use of energy. Whole areas of the world's irreplaceable resources have been spent as casually as a child might toss away a dime. But men of science, caretakers of the human race, have always gone against *that* grain, seeking ways to husband nature's stores, to make their expenditure more productive. Recent progress in atomic research is a case in point.

Equally prodigal has been mankind's use of mankind's potentials: energy misspent; careers terminated before they began; evident abilities starved of sustenance; talents left dormant or squandered in dead-end streets: huge areas spent as at the flip of a coin. And equally have men of education, caretakers of the human race, gone against *this* grain. As they have pushed their study ever closer, as they have peered into the mysteries of the human mind, they, too, are learning how more fruitfully to exploit the potentials of the Johnnie Joneses, the Johnnie Greens, the Johnnie Smiths in their classrooms for the fulfilment this nation or any other nation dedicated to democracy must have.

Here, too, it is a question of initiating a chain reaction in the youngster's life: illuminating clearly his goal; establishing in him a desire to achieve it; setting the feet of the Man of Tomorrow on the path; clearing obstructions from the flow of his energy so that it may be self-generating and self-sustaining.

As far apart as success and failure are, the fork in the road is almost unperceptible; subtle are the reasons why one boy responds to a pictured goal and another does not; the problem is so complex that not one factor dare be overlooked. When a boy comes to drafting class for example, carelessness must not be the keynote of his introduction. The human mind works by analogy. If the boy's drawing instruments are cheaply made and carelessly chosen, then casual indeed may be his response to the work. If these tools of engineering achievement are not vested with value—yes, and with glamor, none need be surprised if the boy's imagination does not take fire. It is the boy's future that is at stake: almost unperceptible is the forking of the roads; a touch on one side or the other may be enough to swing him from right to left. Petty economy has no place in a situation such as this.

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16" Swing
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•

TURRET LATHES

Series 900—9" Swing
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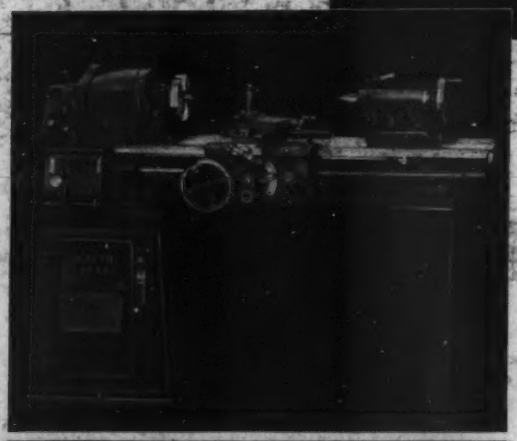
16" x 6' SOUTH BEND TOOLROOM LATHE

13" x 5' SOUTH BEND QUICK CHANGE GEAR LATHE



9" x 3' SOUTH BEND MODEL A BENCH LATHE

The outstanding records for performance and dependability that South Bend Precision Lathes have achieved under the critical demands of American industry recommend them for student training purposes in the school shop. These essential lathe qualities—performance and dependability—plus ease of control, simplicity of operation, unfailing precision, unusal versatility, and built-in safety features, make South Bend Precision Lathes the logical installation for those school shops where the quality and thoroughness of training are principal considerations. Certainly, too, it is to the students' advantage to learn in school to operate the lathes which they are most likely to use in industry. Write today for Catalog 100-D which illustrates and describes all South Bend Precision Lathes.

TEACHING HELPS FOR SHOP CLASSES

Manuals, sound films, wall charts, booklets, and other teaching and study helps on the operation and care of metal working lathes are available to shop instructors, supervisors, and trainees. Write today for free Bulletin No. 22 which illustrates and describes this valuable educational material!

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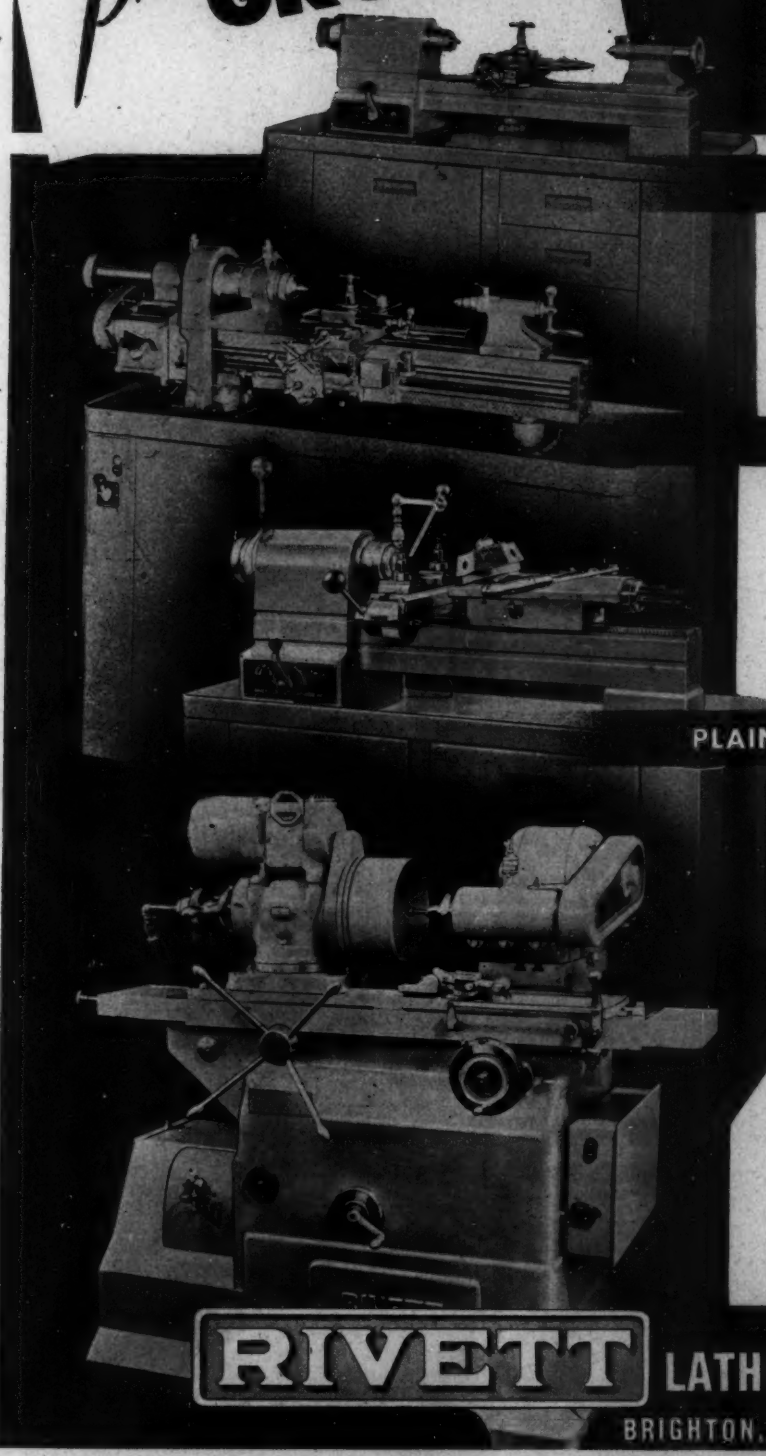
466 EAST MADISON STREET, SOUTH BEND 22, INDIANA • *LATHE BUILDERS SINCE 1906*

PRECISION *Proving* GROUND



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An engineered unit, quick to set up, with power, wide speed range, and vibrationless performance; capable of many jobs often produced on heavy, costly, machines. No. 715: swing: 7" dia.; center distance: 15"; collet cap.: ¾" max.: No. 918: swing 9" dia.; center distance: 18"; collet cap.: 1" max.

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No. 608 back-geared, screw cutting, precision lathe for production of fine work. It will handle a great variety of parts in minimum time. Finely made attachments for milling, spiral cutting, slotting, relieving, taper and ball turning, grinding, forming, and multiple operations are available. Swing 8½" dia.; center distance 18¼"; collet cap.: 1" max.

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Primarily for tool room work requiring wide variety of operations. Attachment for external grinding. Fine table feed with micrometer stop for shoulder and face grinding. In two sizes: No. 112, grinding cap. up to 8" dia.; table travel up to 8". No. 104, grinding cap. up to 3" dia.; table travel up to 4".

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Your nearby Black & Decker Distributor will be glad to give you information on these Drills, Drill Stands and other accessories that will increase the value of your school shop's present drills. For your free copy of our complete catalog, write to: The Black & Decker Mfg. Co., 680 Pennsylvania Ave., Towson 4, Md.

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Home Craft Sets are supplied either in the steel case illustrated or mounted on a panel which can be hung beside the lathe.

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● This set of 8 tool holders provides for all regular lathe operations and is ideal for school shop use on lathes from 7 to 10" swing. Drop-forged from tough steel, accurately machined and specially heat-treated, these holders represent the same fine quality as the Williams industrial line. The high-speed steel cutters furnished, are ground, ready for use except those for turning. The "diamond-point" turning cutters require only a minimum of grinding to desired form. Sold by Industrial Distributors everywhere. Write Dept. I-546 for descriptive literature.

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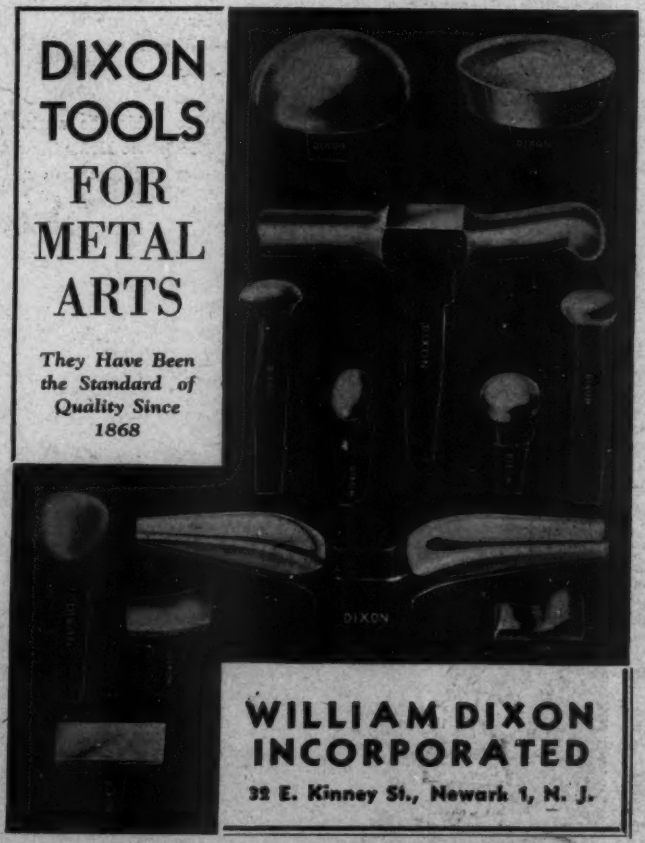

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AUTOMETRIC BORING MACHINE

Advanced in every detail the Model C Autometric Boring Machine offers initial high accuracy — design and construction to sustain this initial high accuracy through out a long productive life — unexcelled simplicity, ease and convenience of operation.

Note these "shop-tested" features:

- Column, bed and chip guard cast in one sturdy unit — integral design.
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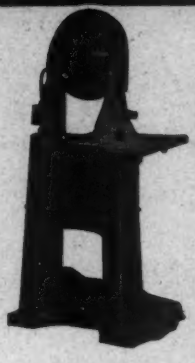
WALLACE
"MACHINE-OF-THE-MONTH"



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16" diameter wheels. 8" capacity under guide. Standard wheel speed, 1100 r.p.m. Blade speed, 4600 feet per minute. Geared motors, direct-connected ½, 1 and 2 h.p. Built-in light. Net weight, 335 lbs.

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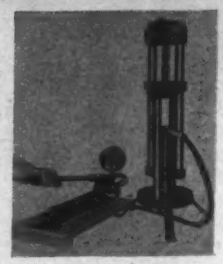
National Carbide (in the red drum) is made from the finest available coke and limestone by the most modern manufacturing methods. It is evenly sized and dust-free, and gives a high, uniform yield of acetylene gas. Available in six sizes in 100 lb. and 25 lb. drums, and 2 lb. and 10 lb. cans.



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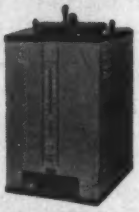

Wilson 200 Amp. "Bumblebee"

The Wilson "Bumblebee" AC welders (indoor and "All-Weather" models) are supplied in 300 and 500 amp. sizes and other AC units in 100, 200, 750 and 1000 amp. sizes.

A complete line of shielded arc AC and DC electrodes. Airco No. 78E and 79E are ideal for DC all-position, general purpose welding where excellent physical qualities are needed. Airco No. 87 is recommended for single or multiple pass DC or AC welding on rusty work and where fit-up is poor. Airco No. 230 is a "top-notch" electrode for all-position AC welding.

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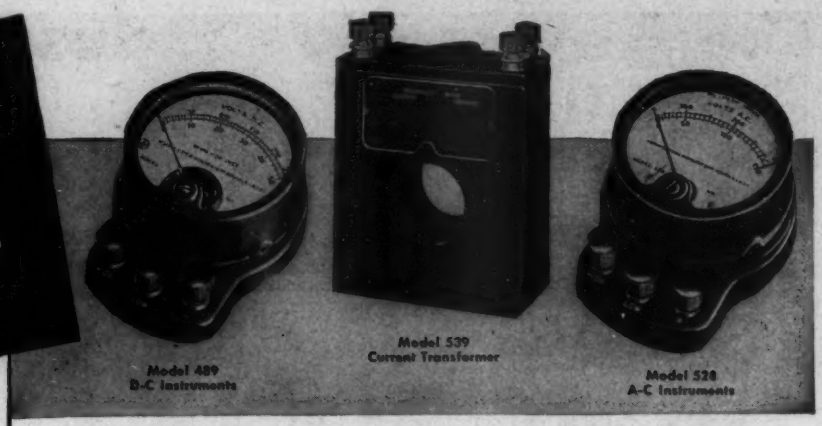

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Model 539 Current Transformer

Model 528 A-C Instruments

Models 528 and 489 are companion lines, and are available as AC and DC Voltmeters, Ammeters, and Milliammeters, in single and double range instruments. Provide compactness, ruggedness and all-around serviceability.

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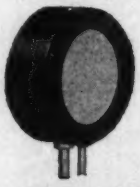

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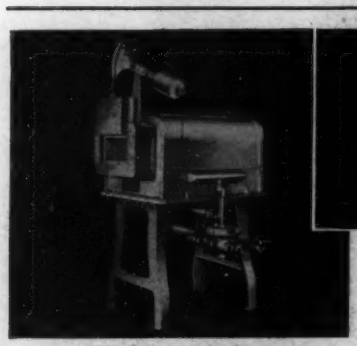
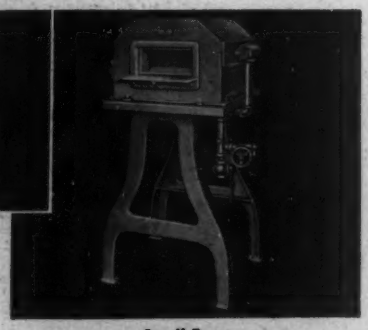


Small Semi-Muffle Oven



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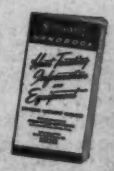
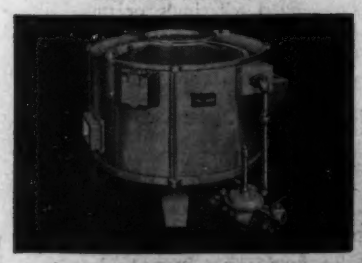
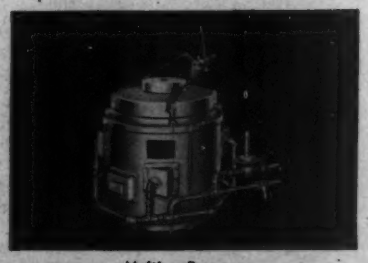




Round Pot Furnace



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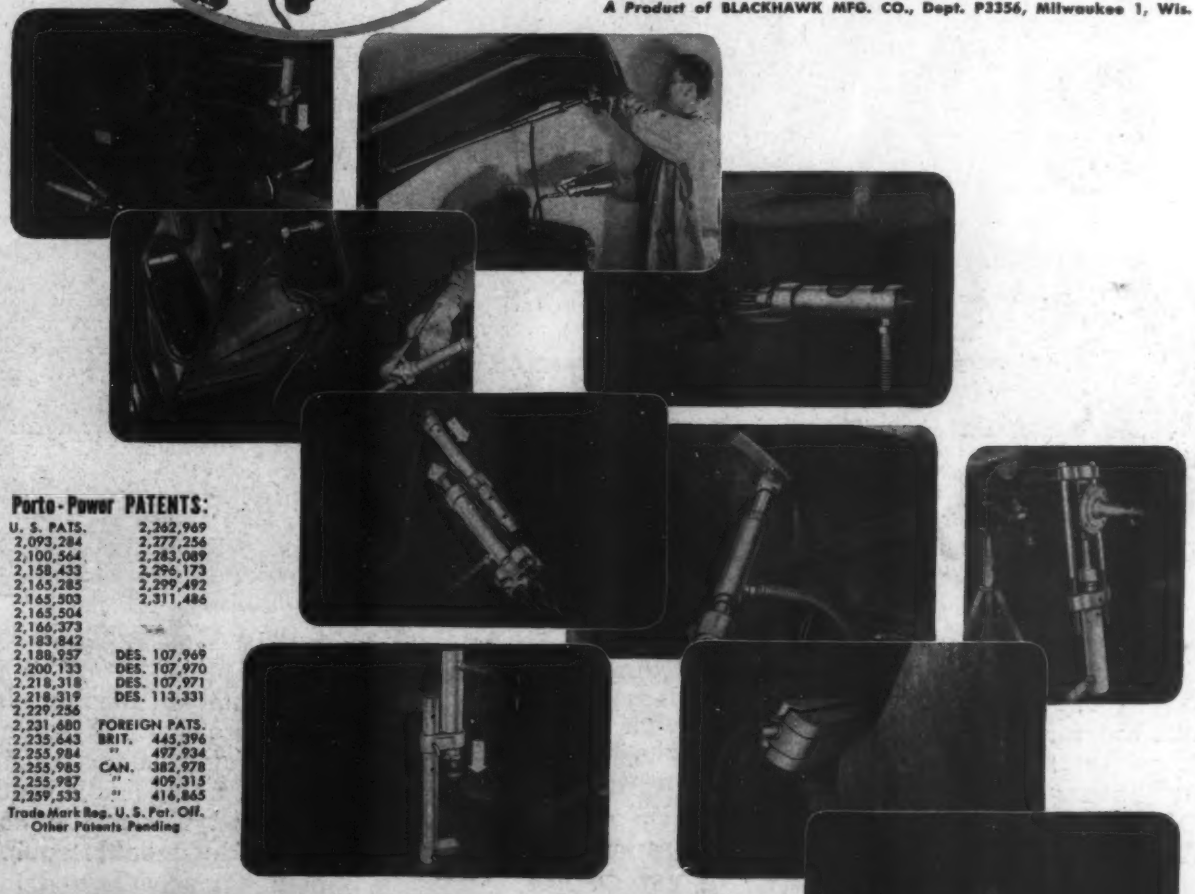

Porto-Power PATENTS:

U. S. PATS.	2,262,969
2,093,284	2,277,256
2,100,564	2,283,089
2,158,433	2,296,173
2,165,285	2,299,492
2,165,503	2,311,486
2,165,504	
2,166,373	
2,183,842	
2,188,957	DES. 107,969
2,200,133	DES. 107,970
2,218,318	DES. 107,971
2,218,319	DES. 113,331
2,229,256	
2,231,680	FOREIGN PATS.
2,235,643	BRIT. 445,396
2,255,984	" 497,934
2,255,985	CAN. 382,978
2,255,987	" 409,315
2,259,533	" 416,865

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Other Patents Pending

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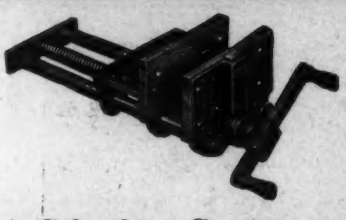

★ Columbian Continuous Screw Woodworker's Vises are furnished with hard wood handles — or may be equipped with ADJUSTABLE STEEL HANDLES as above, to eliminate handle breakage, speed operation and provide extra leverage.

Quality and performance of Columbian Vises are responsible for their popularity in school shops. Train students with the vise they will use in the future. Undoubtedly it will be a COLUMBIAN because Columbian is the world's largest producer of vises with a reputation for doing its job well. This reputation we will carefully guard.

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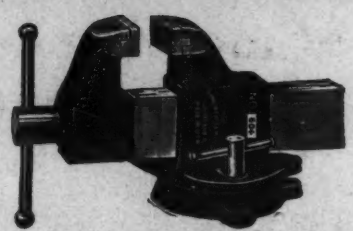

★ Columbian Machinist's Vises are made of malleable iron castings, guaranteed unbreakable, and designed to provide accurate dependable equipment for schools and industrial shops. All standard types.

THE COLUMBIAN VISE & MFG. CO.
9022 Bessemer Avenue Cleveland 4, Ohio
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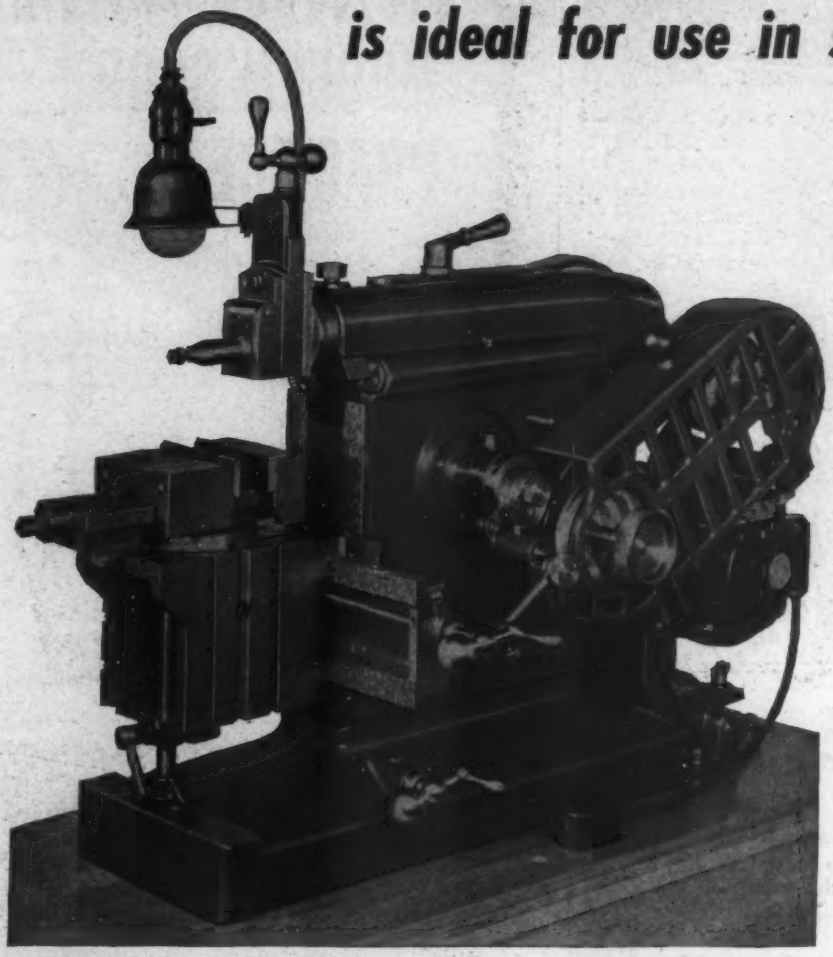
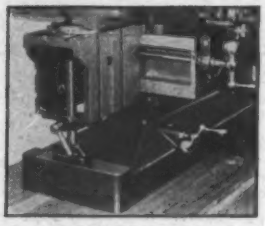
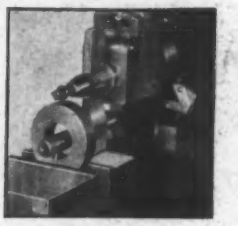
AMMCO 7" PRECISION SHAPER

is ideal for use in school shop!

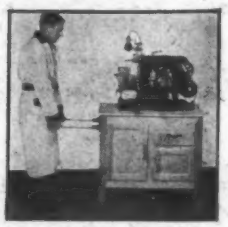




★ Has "VEE" Type Ways, comparable to those of large, expensive shapers.



★ Handles a wide variety of work.



★ Portable Model is mounted on maple cabinet.

Students quickly acquire ability to produce accurate work on this precision machine

Leaders in school shop instruction unreservedly recommend the AMMCO 7" PRECISION SHAPER. It is small in size, but it is mighty in efficiency and precision... It incorporates all important features of larger machines selling for hundreds of dollars more than the Ammco . . . and users of the Ammco tell us "it's the finest made". . . Simplicity of operation, plus special safety features, make this machine ideal for student use. A wide variety of work can be done on this shaper, and as one instructor has said —"it is a precision machine of a thousand uses."

Made for bench installation, or as a portable unit.

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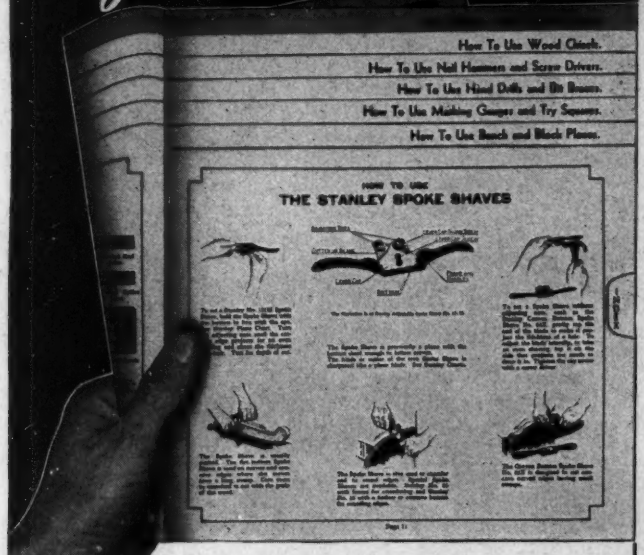
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How To Use Hand Drills and Bit Braces.
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HOW TO USE
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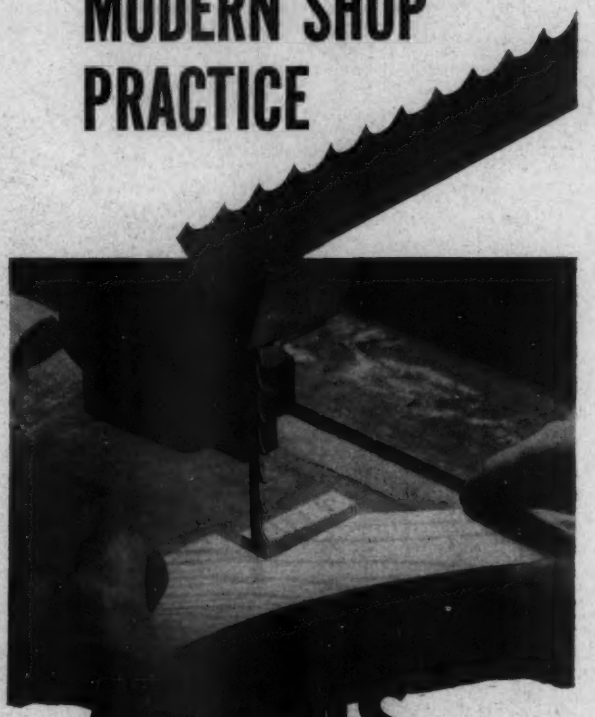

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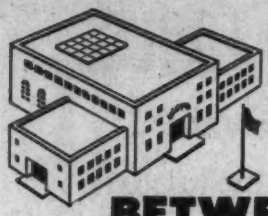

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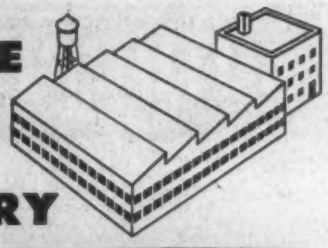

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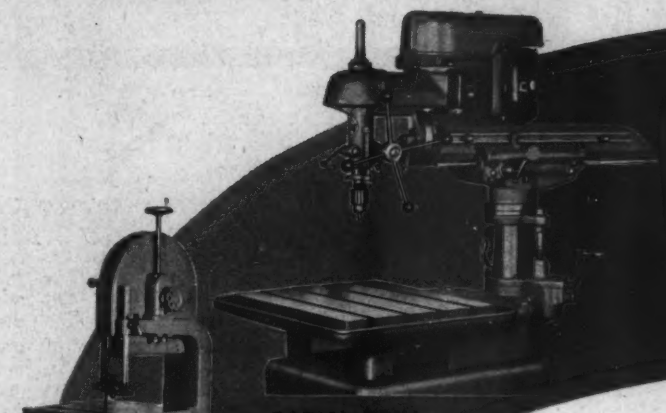

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Students trained on Walker-Turner Machine Tools find the transition from school to factory easy. Their daily school work has familiarized them with the very machines they'll find by the thousands in Industry. That's one of the big advantages of using these *production* machines.

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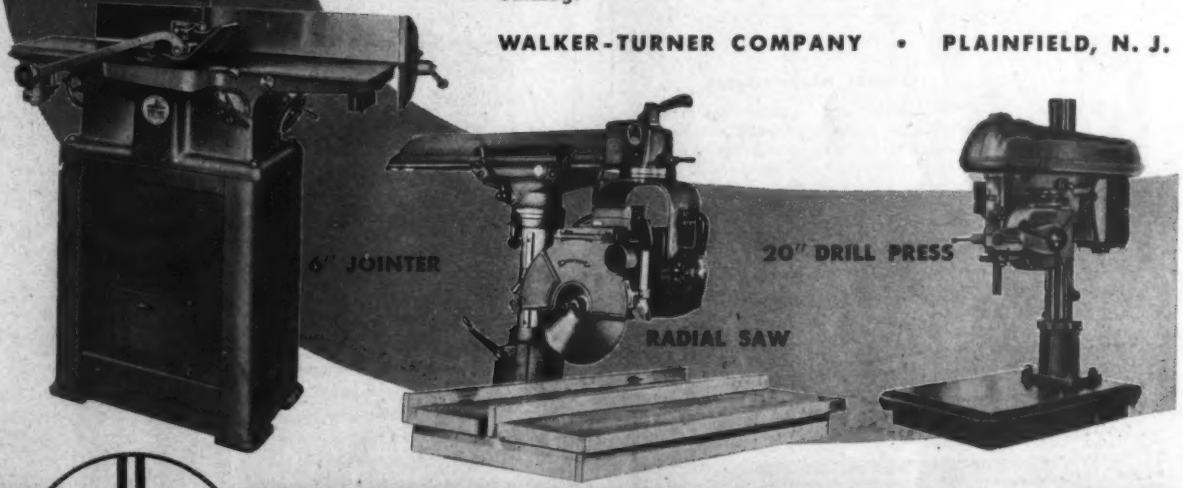

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DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
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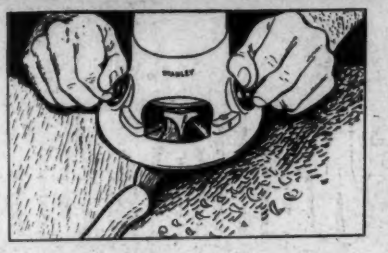
Add a Bit...
for distinctive work on wood

Molding for edge of pie-crust table top.



Beading to finish edge of plaque or other decorative piece.

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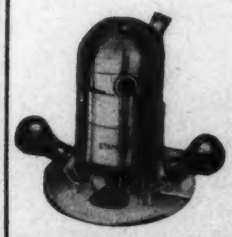

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Each new bit adds another operation to stimulate and encourage your students. Catalog 607 describes and illustrates the varied possibilities of this perfectly safe, easy-to-use tool. Send for your copy today.

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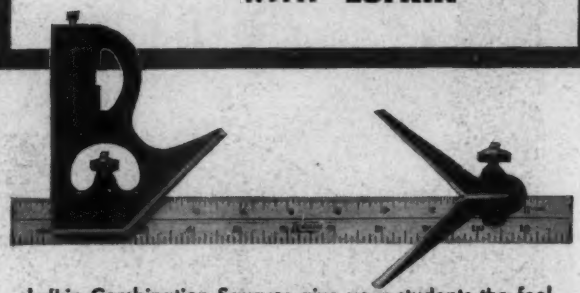

Lufkin Combination Squares give your students the feeling of confidence that can be obtained only through the use of fine, accurate tools. Equip your students with Lufkin tools, the same used by careful machinists and toolmakers throughout industry. Write for free catalog. THE LUFKIN RULE CO., SAGINAW, MICHIGAN, New York City

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ARMSTRONG
TURRET LATHE AND SCREW MACHINE TOOLS

Today, America Needs TURRET LATHE and SCREW MACHINE OPERATORS

The transition from tooling-up to all-out production has increased the need for turret lathe and screw machine operators. When preparing your courses to help fill this need it would be well to build them around ARMSTRONG TURRET LATHE and SCREW MACHINE TOOLS. These are provided for the basic operations, and take standard drills and knurls or cutters that anyone can quickly grind from stock shapes of high speed steel. Permanent, multiple-purpose tools, they reduce tooling-up to the selection of cutters, adjustment for clearance and tightening of set screws.

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"The Tool Holder People" 322 N. Francisco Ave., Chicago, U. S. A.
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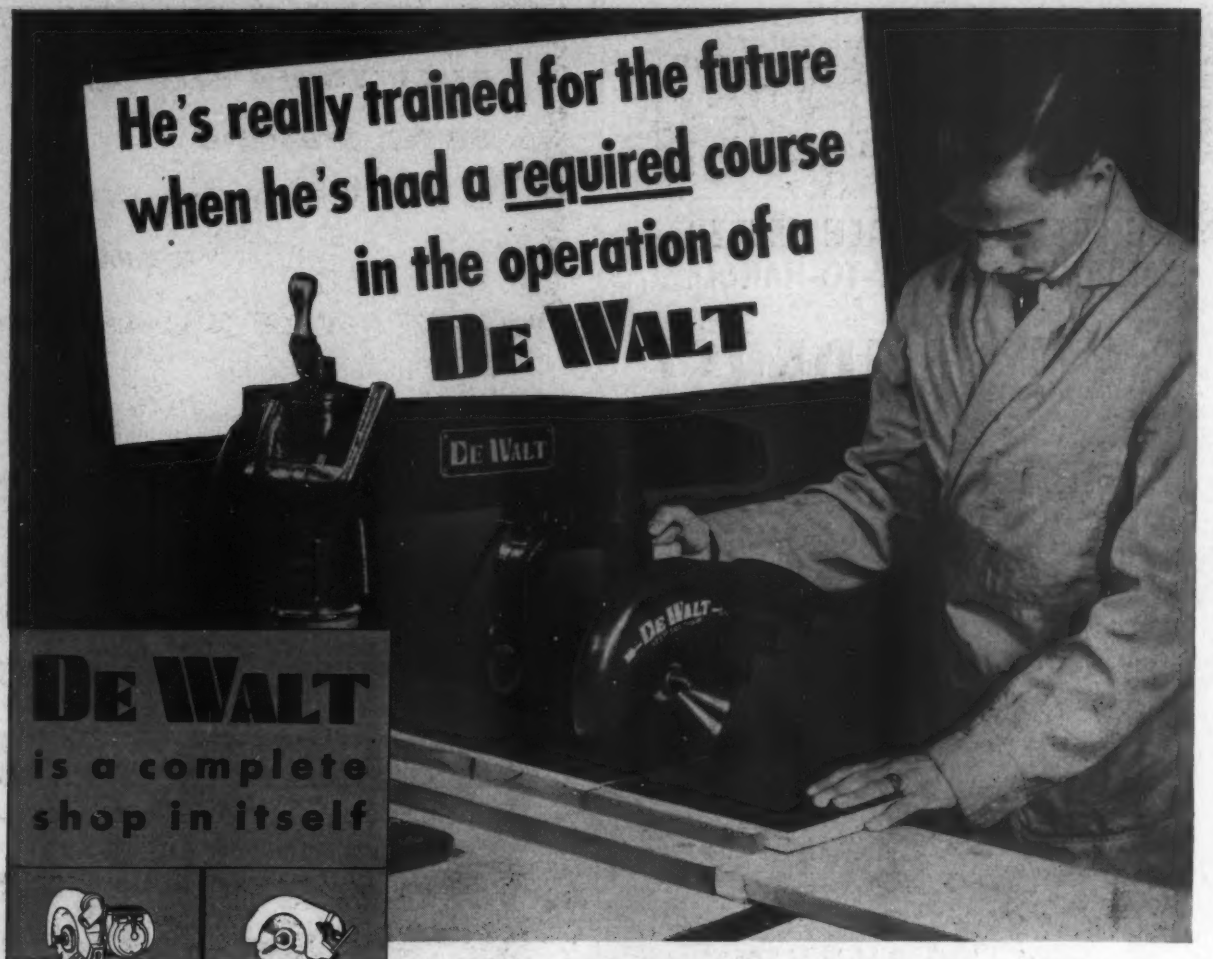
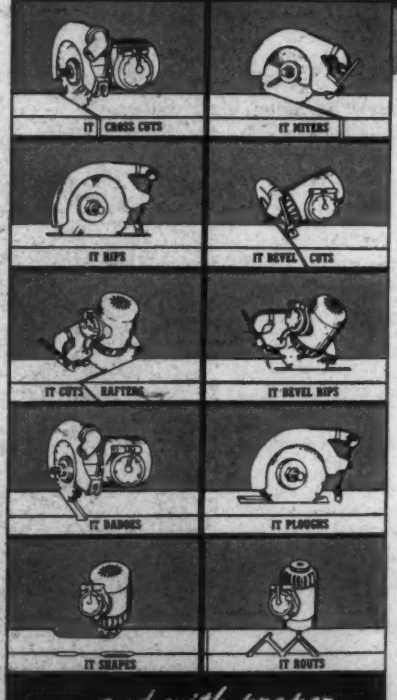
He's really trained for the future when he's had a required course in the operation of a DE WALT



DE WALT is a complete shop in itself



...and with proper tools makes any cut possible!

After the student has completed his basic training course in the use of hand tools, he should have a *required* course in the operation of DeWalt.

Knowing how to make the fullest use of this flexible, easy-to-operate machine, will give any student a head-start as he prepares for tomorrow's industry.

When he leaves school he will be fully acquainted with a machine that is destined to occupy a prominent place in tomorrow's industry. The perfection of the DeWalt saw has created new methods in cutting wood, making obsolete old-style equipment previously used.

We urge you to investigate DeWalt. *Install* DeWalt in your school.

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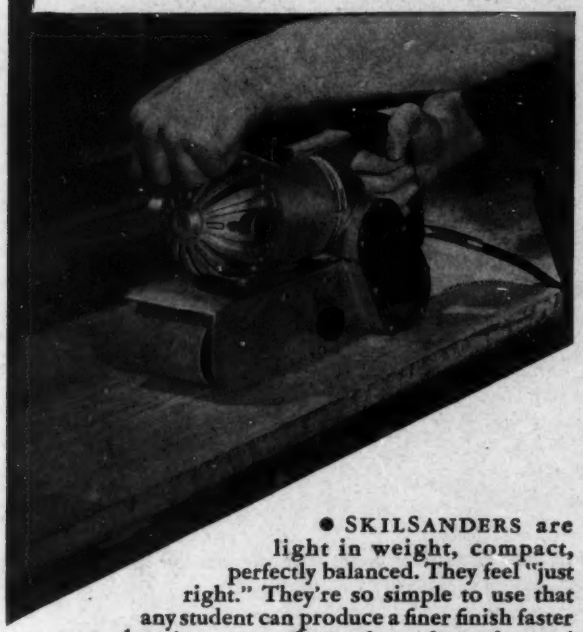

● SKILSANDERS are light in weight, compact, perfectly balanced. They feel "just right." They're so simple to use that any student can produce a finer finish faster and easier on any flat surface of wood, metal or compositions.

And SKILSANDERS are rugged, dependable, quality-built throughout so they last longer and operate at lower cost . . . help you keep your budget in line.

Let your distributor show you on your own work why SKILSANDERS belong in your manual training shop. Phone him today for a demonstration.

SKILSANDERS are ideal for refinishing desks, blackboards and woodwork. They're preferred by industry everywhere for speed, economy and easy handling.

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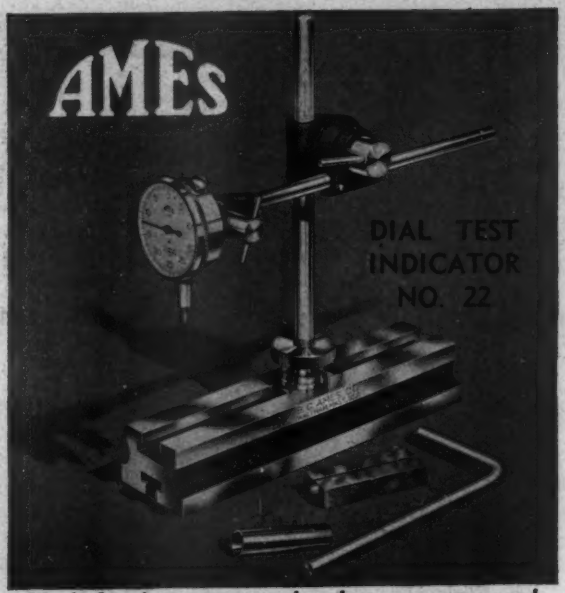
PORTABLE ELECTRIC

SKILTOOLS

MADE BY SKILSAW, INC.



Ideal for inspectors, tool-makers, scrapers and assemblers to test in thousandths, half-thousandths or tenths of thousandths inches. Adjustable to all positions and used in tool holders of various machines. Priced at $30.

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An

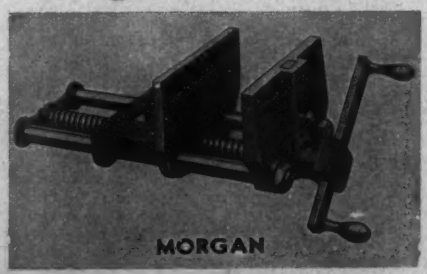
UNBEATABLE COMBINATION

MORGAN VISES

Swivel Base Machinist's Vise

Perform a service to your school and give your students a real vise to work with. Specify MORGAN when you equip your shop, and get the best at no extra cost.

Morgan vises represent more than 30 years of experience in manufacturing vises. The best materials and exacting workmanship mean strong, rigid and long lasting service in Morgan Vises.



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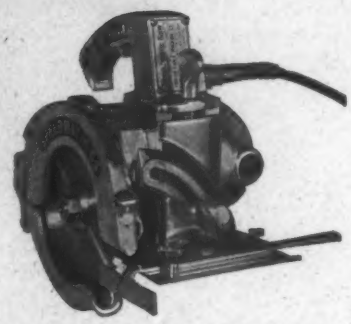
NOW...Your Students Must Compete for Jobs!

For a headstart...

Train them on the "TOOLS OF INDUSTRY"

Bench-Belt Grinder
This is the machine that has replaced the grinding wheel over a large part of American Industry. Found in every department of every type of industry. Extremely useful, too, for school maintenance!



G-4 Belt Surfacer
An all-around Surfacer that prepares the student for countless operations on the same machine—in leading plants!

Speedmatic Saws
Here's an essential element in the coming mechanism of the building trades!

G-8 Abrasive Belt Surfacer
Here's a real production line machine! Thousands of industries improve quality and save money with this Surfacer!

Speedmatic Floor Sander
Many successful businesses have been built by trained Floor Machine operators. Essential to the school!

Take-About The Dustless Sander

Skilled Sander operators find their way quickly to high-salaried woodworking jobs!

• *See* PORTER-CABLE *Film* "MACHINE OF THE AGE"

Showing the application and operation of Wet-Belt Surfacers. Available to vocational schools FREE.

Porter-Cable

One of the best ways to be certain that your students will have a headstart in the coming competition for jobs is to train them on the tools that industry uses! PORTER-CABLE tools are the tested tools of industry. Train on them . . . and use them also for school maintenance.

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It's the "ringing" test for soundness. The inspector taps the file on a metal block or anvil. If its ring is a clear "plink," the verdict is "okeh." If a dull "plunk," most likely there's an invisible "water crack" somewhere . . . and the file is immediately rejected.

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• No matter what the requirement, more than 3000 kinds, cuts and sizes in the Nicholson and Black Diamond lines make available *The right file for the job.* It is one of the reasons why most industrial concerns use these brands—and therefore why the training of students should be conducted with them.

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(In Canada, Port Hope, Ont.)

NICHOLSON FILES FOR EVERY PURPOSE

Requisition Time

The need for planning for the next school year is again upon us. Probably at no time was this task more difficult than it is at the present moment. Enrollments are rising, especially in those vocational subjects likely to be chosen by returning veterans. Coupled with this is the fact that much of the equipment and various types of materials are still unobtainable.

The thing confronting every teacher of industrial arts and vocational education, then, is to requisition everything needed, and get the orders for the requisitioned items to the dealers and manufacturers as soon as possible. Equipment and materials, as they arrive, will go to those who ordered them first.

The advertisements in the current and other issues of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will be a help to those who are looking for sources from which to order certain items. F. C. Finsterbach's article on page 204 of this issue contains a helpful list for teachers of laboratories of industry. The shop lists in the 1946 issue also may be found helpful.

Summer School Opportunities

BRADLEY POLYTECHNIC INSTITUTE, Peoria 5, Ill. Two 30-day terms, beginning June 17.

OREGON STATE COLLEGE, Corvallis, Ore. Two terms: June 18 to July 26; July 27 to August 30.

THE PENNSYLVANIA STATE COLLEGE, State College, Pa. Intersession, June 10 to June 29; main summer session, July 1 to August 10.

STATE TEACHERS COLLEGE, Oswego, N. Y. Six-week session, July 1 to August 8. Eight-week session, July 1 to August 23.

THE STOUT INSTITUTE, Menomonie, Wis. Three-week and six-week courses. June 17 to August 16.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn. Two terms: June 17 to July 27; July 29 to August 31.

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles 7, Calif. Six-week term, June 24 to August 2. Four-week term, August 5 to August 30.

WESTERN MICHIGAN COLLEGE OF EDUCATION, Kalamazoo, Mich. July 1 to August 9.

This Month's Cover

The picture on the cover, this month, shows a student learning the intricacies of saw filing. The photograph was submitted by Geo. A. Willoughby, Michigan State Normal College, Ypsilanti, Mich.

Industrial Arts and Vocational Education

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

Published monthly except in July and August

THE BRUCE PUBLISHING COMPANY

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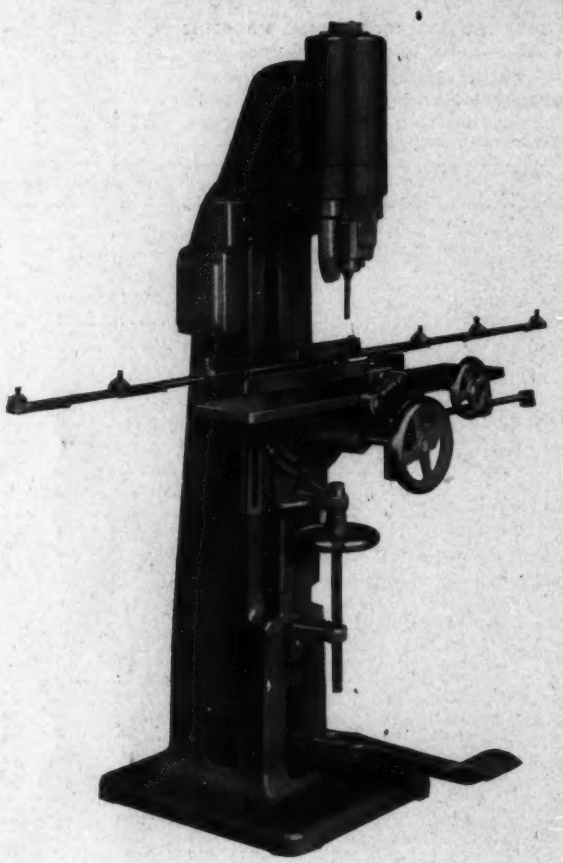

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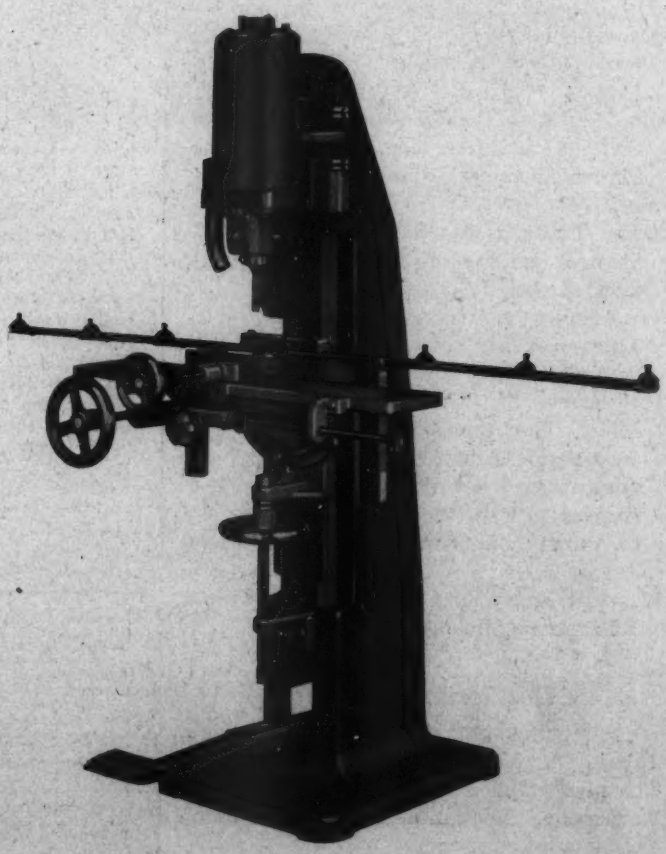

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Universal Military Training and Its Implications for Industrial Mobilization

*Edward A. Fitzpatrick**

When I was asked to discuss this subject I wondered who had discovered the relationship between universal military training and industrial mobilization. No reference has been made to it that I can recall in official War Department discussions of the problem, nor in the widespread public discussion was there any indication of any relationship. The hearings before the Committees on Postwar Military Policy developed nothing on this subject; nor did the Congressional hearings on the very inadequate bills now before Congress. President Truman did have a reference to it in his speech of October 23, 1945. In my book on "Universal Military Training" I threw out for discussion a number of suggestions about some relationship but never developed them. That I shall try to do herewith.

A Broader Kind of Military Training

The question proposed is particularly interesting as revealing a broader character of military thinking than is usual. Things are ordinarily not seen in their relations but as the philosophers say as things-in-themselves. In the army we break down problems and duties, and we assign these problems and duties, so the language goes, to "desks." That takes care of everything because we think in our naïvete that all we have to do is to assign an officer to a desk — and no matter what his preparation or what his previous experience or even his I.Q. — he is endowed by the assignment with all the knowledge, insight, and skill necessary to solve the problems that pass over that desk. But in any case it is not unfair to say, we muddle along. Probably we ought to reject the concept of the omnicompetence of military personnel.

Industrial Mobilization Neglects Man Power

I suppose one of the best illustrations of that is industrial mobilization before the war so far as the public plans go and so far as they have come within my knowledge unprotected by "restricted," "confidential," or "secret" stamps. A great deal of the prewar planning of the industrial mobilization proceeded without any serious consideration of the man-power problem. At a meeting as far back as 1924, or thereabouts, Dwight L. Davis made a speech to the Wisconsin Manufacturers at the Pfister Hotel in Milwaukee at which I represented the Scanlan Morris Co. of Madison, and I called the attention of Mr. Davis to this defect. Nothing happened though he was much interested in the problem at the time. Several years later, Major General Mosely came over to a Selective Service Conference in Washington and discussed the industrial mobilization plans. At the time he was asked, at various stages in his speech, three questions relating to man power. His reiterated answer was "I cannot answer that question but someone in my organization can." Isn't it delightful to be as comfortable as that and as certain of the omniscience of your organization?

The Industrial Mobilization Plan of the Assistant Secretary of War

There was an even more striking illustration of this attitude. The Industrial Mobilization Plan of the middle thirties (about 1934) provided for a labor administration to be set up in wartime. It had a national director, as I recall, a state administrator, and a local official, who presumably were to have power to determine deferments though not a part of the Selective Service System. Upon accidental discovery of the plan, though the chart containing it was not too definite, a representative of the Selective Service System — a reserve officer (Col. H. C. K.) — went before a council in the general staff and then seemingly was getting nowhere until he said that he wished now to speak as an ordinary citizen of the United States. He spoke as an aroused individual citizen. The plan was changed.

A Colossal Man-Power Blunder

Could there have been any more colossal blunder on man power than that? Such a control of man-power sources from outside the government and outside of the military authority would have been fatal, and the intoxication of labor from its irresponsible power acquired in recent years as a reaction against the former irresponsible power of management, indicates what might have happened if such a policy had been initiated. Moreover, the Selective Service System plans made in G1 of the general staff were absolutely opposed to such a program — in fact such a program would have completely nullified and destroyed the Selective Service System, violating as the proposal did the autonomy of local boards, the choice by neighbors, and the requirement that the system be self-integrated. Any outside agency could furnish information but decisions must always be reserved for the Selective Service boards themselves. The proposal as made was revised, but there were vestigial remnants.

Selective Service Regards Military Man-Power Needs Paramount

The Selective Service System itself perhaps did not provide adequately for the industrial mobilization. It always regarded as the paramount necessity the furnishing of military man power, though it regarded as a secondary function the maintenance of a balance between the military and the industrial-agricultural demands. But the care of the industrial-agricultural needs of the armed forces and of the civilian population was residuary. The military authorities did not think of an armed force of 12,000,000. It was thinking of an armed force of 4,000,000. Military-industrial balance was easy in that situation but with the usual preoccupation of military planning, of fighting the last war, the scope of the problem had not been anticipated and was not planned for, hence the amount of improvisation.

Unity of Thinking Required by Subject

Unity of organization may be a good thing, but it only deals with machinery. What is really needed is unity of thinking, and this fact must be recognized. Instead of talking about universal training as a thing by itself, of industrial mobilization as something in a little cubbyhole of its own, and of Selective Service as working out of a little office in G1; the three phases of the problem must be related. If they are related, the relations must be taken into account, and they must be taken into account in the planning stage, and not left to improvisation in the fighting stage. So let us see what we mean particularly by universal military training and industrial mobilization, and then try to state the interrelations or implications, trying to avoid the compartment-mindedness of the past.

Universal Military Training

The nature and character of universal military training have been stated fully by the writer, in a book with that title: *Universal Military Training*. In this article stated are only its main conclusions since there is at the moment no official plan that has actually worked out the precise administrative setup, the character of the administrative process, the content of the training in any significant detail that has been

*Adviser on Manpower to Army Industrial College.

made available to the public or given to Congress.

"Universal military training" is the program for providing a reserve of trained military man power, and of having available an immediate trained force in addition to the regular army and the national guard for the common defense. The plan is to train annually the men of a single age group — presumably the 18-year-olds. These men would be conscripted, drafted, or to use the euphemism of the war, selected. Those mentally or physically disqualified in a major way would not be taken, but physical standards would not be *war* standards, so that a larger percentage of the 1,200,000 reaching 18 years of age would be trained. The fact that the War Department proposes using the wartime Selective Service machinery for the peacetime program shows they haven't thought through the problem and analyzed critically the Selective Service machinery. The object of this training is solely military training in the infantry, armored division, quartermaster, ordnance, medical, dental, air corps, and all the work of the ground, air, and service forces. Any educational, social, and physical results are incidental and not the direct objectives. They do not and cannot justify universal military training. The only valid justification of universal military training is the need of the common defense of the nation in the present international situation.

The Problem of Age to Require Universal Military Training

Let us just look at a problem that confronts Congress as the program of Universal Military Training is up for decision. One of the most important problems to be decided is the age at which the training shall be given. The purely military requirements which after muddling along in this war would indicate the earlier the training can be given the better. It seems desirable, therefore, for the age to be 18, for example, rather than 23, or to permit a spread of ages. The moral problem incidental to training has caused a great part of the religious leaders of the country to oppose universal military training. A single age group — 18-year-olds — would seem to be wise in this connection. Is this also the best age for the industrial mobilization point of view. Just over 36 per cent of the 18-year-age group will be in school, the remainder (63 per cent) will have already begun work in factories, shops, offices, and in the fields.[1]

Shall There Be Assignment to the Industrial Mobilization

The proponents of industrial mobilization might properly say "Wait a minute! Where do we get our share of these men? After 10 years you will practically have everybody in the armed forces. Must we confine ourselves to men over 30?" There is an answer to this in the universal military program as proposed, namely, that the program is one for *training* only, and no one will be placed in organized reserve. That makes it possible for the Selective Service System, or its total war equivalent — a National Service Act — to determine who should go into the armed forces and who should remain in industry because of their industrial training or skill, or their industrial education or because of their industrial importance. And the same for agriculture. That will prevent the tragic conditions in England in World War I especially when its young industrial leadership and skilled workers volunteered for service and ultimately had to be called back. It is an indication that in another war "National Service" will very likely replace "Selective Service." This means, too, that the industrial leadership of this country and particularly of this War Industrial College should be critical of any amendments to the proposed legislation affecting a reserve. This applies also to the enrollees in the National Guard.

Industrial Training for Those Liable but not Physically Disqualified

However, there is a suggestion in the President's message of October 23, 1945, on this subject. He suggests that persons not qualified for military training be given industrial training related to war. He says:

> All men should be included in the training, whether physically qualified for actual combat service or not. There should be a place into which every young American can fit in the service of our country. Some would be trained for combat, others would be trained for whatever war service they are physically and mentally qualified to perform.

Continuing, he says:

> After the first few months of training selected trainees who are not physically qualified for military service could be trained in certain skills, so that if war came, they could take their places in shipyards, munitions factories, and similar industrial plants.

This is a perfectly reasonable program but apparently is not within the purview of present war plans. As a training program, as distinct from a service program, it should be an intrinsic part of the present plans for any genuine universal military program.

Industrial Mobilization Does Not Affect Military Training Age Requirement

As against the need of the military forces for young men there is no need of industrial mobilization that would change the designated age for training for military service. For those who have already entered industry or agriculture it would seem that every social and individual consideration would indicate that the earlier the military training is begun the better. They will not have become too important in their industrial or agricultural labor, and the wider contact and broader experience should prove beneficial, and would cause the least interruption of their industrial career. This is also true of those continuing their education. The period at the end of the high school course furnishes a convenient point for the military training. A year's additional maturity plus the social contact and new interests will enrich the continued educational training and experience. To have this interruption while the student is in senior college or in the professional school would result in educational loss through the interruption, the loss of the years continuing the educational momentum, and the period after resumption of studies to catch up.

The Advantage of Diffused Knowledge of Military Art to Industrial Mobilization

Moreover, it will be a great gain for industrial mobilization — as it will be for military strategy and tactics — to have the American public know something about war, its weapons, its conduct, its tactics, and some of its strategy, its relations to politics, and the biography of great generals. As the industrial worker at his bench, the scientist in his laboratory, the manufacturer in his shop cannot help but to recur to this training experience, and may stimulate the inventiveness of these men and the application of his experience to military organization and technique in ordnance or quartermaster or the other numerous service forces needs. You have, in short, generally in the male population after a number of years' training the motivation and the basis for invention, better forms and techniques of organization, and better utilization of resources.

No Occupational Deferments in Universal Military Training

As contemplated the universal military training process will not provide for any agricultural and industrial deferments. This would seem to be a disregard of the needs of industrial mobilization. An advantage of the widest diffusion of the knowledge of military art has just been indicated. There is no real loss in refusing deferments at the 18-year-age period. Practically no one would have a professional or technical training advanced enough to warrant deferment. The professional, technical, and skilled workers who will be needed for war production in a situation of actual war will be deferred by the regular Selective Service System in operation in time of war, particularly if the period of reserve duty — if there be any — is relatively brief. This experience of actual military training will be for these men an excellent means to have them understand the need of the services in wartime and to keep them on the job for maximum production. If the industrial mobilization is more intelligently planned than between the world wars, these skilled, technical, and professional workers will be definitely

[1] Cf. U. S. Dept. of Commerce, Bureau of Census, Series P-19, No. 4. In school at 18: over-all, 36.4 per cent; male white, 39.7; female white, 35.9; male Negro, 25.1; female Negro, 27.1. There were 1,142,185 male whites in this age group, of whom 453,603 were in school. The male nonwhites numbered 139,453 of whom 35,047 were in school.

marked so that they will not be called to active duty from a reserve status if they are needed for war production. They might be required to do what F.B.I. agents did at the beginning of the war, give up their commissions, if they are in the reserve, because of the value of their service to the defense of the nation.

It would seem, therefore, that there is no need to provide for occupational deferment in the system of universal military training. This is true also regarding food-production problems. If there should be any shortage in any particular areas and the numbers involved do not seem to require occupational deferment, then the various methods used in wartime could be used to supplement the agricultural forces in such an emergency, but in no case does there seem to be any real necessity or provision for making the agricultural deferments necessary in wartime.

An Industrial Mobilization Plan Necessary to Determine Content of Training

Obviously the industrial mobilization should be interested very much in the kind or content of the training received during the year of universal training. There is no indication in any statements I have seen that those in charge of industrial mobilization have interested themselves in this problem. This is a part of the compartment-mindedness of departmental organization. Obviously in training for the service forces those in charge of the industrial mobilization should be in contact with the most advanced developments in industrial and commercial experiences. Just as I suggested that the regular army (and the regular navy) should be a continuing maneuvering army in possession of the best experience of the world testing them out in actual maneuvers, so the industrial mobilization group in continuing intimate contact with the most advanced industrial and agricultural experience should be transmitting the benefits of this knowledge to the training groups in engineering, in ordnance, and the quartermaster corps. This would apply by way of illustration to improved transportation methods, warehousing, better and simpler systems of records, supervisory techniques, better food processing, better methods of packing, better bridge building, new construction techniques, and through the thousands of processes and techniques which the service forces of an army needs.

No determination of the content of the training in the universal military training can be adequate — even intelligent — unless there is worked out in advance an industrial mobilization plan as well as a strategical plan. This applies also to Selective Service, and the explanation of much of the muddling in the first year of this war was due to the fact there was no relation between the Selective Service process and any plan that may have existed. This is true also of the deferment policies and the improvisations which took the place of an industrial mobilization plan. This is the same relation that universal military training will have — our present interest — to industrial mobilization. There must be an industrial mobilization plan at the basis of the actual training program. This should be an adjustable evolving plan but to be helpful it must be definite at whatever stage it is.

The Need for a Mass Army?

The preceding statement furnishes an opportunity to call attention to a position frequently taken by opponents of universal military training and proponents of a diluted training. The whole question is just shoved aside with the statement: "The day of mass armies is over. What these men need is technical training." Before answering this assumption it may be noted that there is no suggestion that the armed forces to be raised is to be a mass army as the term is used. The day when mere numbers of human beings were determining has been gone for some time.[2] Military strategists talk about "fire power" as determining. Infantry soldiers, ground forces need a whole lot of technical knowledge. Naturally, so do enlisted men in the engineers, the ordnance, in transportation corps and in the varied services of the quartermaster department and the service forces generally. If this technical knowledge is to be used not only in the school of the soldier, but must be applied to larger unit training including division and "army" training, in co-operation with air and ground forces and in amphibious and triphibious campaigns, then you cannot wave out of the picture with a slight-of-hand movement, the actual military problems that confront us, including universal military training. This need is most frequently associated with information on the time it took to train replacements to go into organizations, presumably well organized and well trained, which would sustain the replacement and continue his training if he wasn't killed. That the organizations which the replacements joined were not always of this character is part of the fortunes of war.

Universal Training for Military Service in Atomic Warfare

Or are the opponents who use the "mass army" argument trying to say that such large numbers as the mass army implies are not needed.[3] Obviously in total war the more widely distributed the technical knowledge needed for war in its specific applications, the better it is for the conduct of war, for the industrial mobilization, for civilian defense and for the maintenance of the civilian economy in the emergency. Who ever denied that such knowledge was military knowledge which would be given in the universal military training program and will constitute the proportion of the training which in the judgment of the real, rather than the amateur and hot-stove strategists, is necessary. Who has nerve enough to assume that only "squads right and left" and just shooting a gun was all there is to military training for total war in an atomic age? It is really surprising the number of bold and daring military strategists there are in the civil life of this very unmilitary nation!

The Securing of Industrial Man Power in Wartime Without Losing the Values of Military Training

The function of the universal military training will relate to the whole conduct of war, not merely the "fighting war," though in the last analysis everything is related to that, and must be related to that. The rest of the armed forces and the industrial mobilization are the "overhead." So we turn to the general population facts now in relation to the actual conduct of war. If a war should occur in 1966 there would be 20 classes of men in the universal military training system:

800,000 would be in training.
800,000 would be less than 1 year from their training.
800,000 would be less than 2 years from their training.
800,000 would be less than 3 years from their training.
12,800,000 with the training 3 years or more.

There would be 8,000,000 men between the ages of 17 and 38 (not allowing in this calculation for deaths) who would not have received the universal military training. It is a serious question whether the physical standards, which is the most vital factor here, could not be reduced in order to bring more within the military training program.

A strictly universal training program would provide an equivalent training for this 8,000,000. This problem has not been considered and somebody in the Army Industrial College might at least do some exploration work on it on the present assumptions of Selective Service, but much more significantly in relation to a program of "national service."[4]

War: Assuming All Trained Were Called

In the assumed situation of a declared war or a war begun without any formalities there would be 16,000,000 men between 18–38 who had undergone military train-

[2] In this connection the statement of President Truman in his message of October 23, 1945, strongly urging universal military training, is relevant: Modern war is fought by experts — from the atomic scientist in his laboratory to the fighting man with his intricate modern weapons. The day of the minuteman who sprang to his flintlock hanging on the wall is over. Now it takes many months for men to become skilled in electronics, aeronautics, ballistics, meteorology and all the other sciences of modern war. If another national emergency should come, there would be no time for this complicated training. Men must be trained in advance.

[3] Cf. General Marshall's Statement in His Report to the Secretary of War vs. The Number of Men Needed to Deliver the Atomic Bombs.

[4] Cf. President's statement quoted earlier.

ing. Let us assume first that all these men are reserved for military service. That would leave available for the industrial mobilization

4,000,000 men 18–38
20,000,000 women 18–38
6,000,000 men 39–45
6,000,000 women 39–45
14,000,000 men 45–65
14,000,000 women 45–65

These are the people who are available — not forgetting the possibilities of the younger people for agricultural help, nor the older people in a great many ways — for the industrial mobilization, for civilian defense, and for the maintenance of civilian life.

War: Applying a Selective and Sifting Process

Let us assume a more realistic situation of an actual war. Of the persons who were trained under the military training program many will not be fit for military service and many others will render a more important service to the nation and to the fighting force in the industrial mobilization than in the armed forces themselves. This will include young industrial leaders, many managers of enterprises, many scientists in industrial laboratories, in government and in the universities, many highly skilled workers and foremen. It might be proposed after 1940 and 1941 muddling that when the war occurs then men in training and the men in the two or three previous classes should be considered exclusively for the armed services. These, with the regular army and navy and the national guard (also sifted for personnel essential to the industrial mobilization) should be an adequate protective force and an initial striking force.

What shall be done with the 12,800,000 or 13,600,000 persons who have had military training. To them should be applied the standards or principles of classification of a selective service system or the principles of assignment of a "national service system." Having the basic military needs provided for in the impact of war, the selection or assignment of personnel essential to the managerial, technical, scientific, productive, or inspectorial aspects of the industrial mobilization can be selected from the group liable for military service, in the higher age brackets as well as from those not liable and from women.

Interrelation of Universal Military Training, Selective Service and Industrial Mobilization: Utilization of Man Power

It will be observed that the Selective Service System, and occasionally national service, has been frequently referred to throughout this paper. The gap between the universal military training system and the industrial mobilization must be bridged by either of these systems. The military authorities loudly called for the national service system in 1944 and probably late in 1943. England had under Mr. Bevin a national service system in the Ministry of National Service.

It has been pointed out that if all the men who are trained were placed in a reserve the industrial mobilization plan could be seriously affected. Some process of selection and assignment of such men *and* of all the remaining adult population (at least over 18) must be provided for in total war for an orderly industrial mobilization. Certainly for men and women in the armed forces and in the industrial mobilization there will be need for a more intelligent, and, therefore, more effective utilization of man power. It must not be left so much to accident, to personal acquaintance, to bureaucratic red tape or to the machinations of intrenched personnel at the moment.

The need for effective utilization of personnel in wartime both for military service and for industrial mobilization would seem to demand a National Service Act. This will require in America's thinking a rather completely new orientation, and a plan in accord with America's justice, fair play, and equal obligation must be worked out. There is a nice job for you.

The Need for a Man-Power Policy for Industrial Mobilization

In short, we need a definite man-power policy for the industrial mobilization that is directed both in relation to universal military training of a particular age group, and a selective service or national service policy directed to the whole population at least above 18 years of age.

A policy will make impossible uncertainty and muddling during the war about "work or fight" orders under selective service, the compromises, the deviations from law and good administration, and the partial substitutes for national service. Moreover, the national interest must be made the supreme interest of the nation in wartime and no coddling or subterfuge, or "little monarchies" should be even considered as possibly interfering with it. It should be one nation, indivisible, with justice for all, even in wartime. This is a necessary supplement of the universal training and requires, as has already been stated:

> A courageous constructive policy for the industrial mobilization needs to be taken by those who plan for war including: (*a*) a full utilization of the "work or fight" principle under the Selective Service System; (*b*) a partial or complete utilization of the national service principle as necessary in a total war; (*c*) a national point of view characterized by justice, fair play, and no special privilege, rising above special interests of classes, groups, and organizations. It must be a realistic, specific policy and program.[8]

A Further Development of the Man-Power Policy

If this statement were to be further developed in the light of the foregoing discussion it would be worded as follows:

A courageous constructive man-power policy for the industrial mobilization as an indispensable part of all war planning particularly concerned with the intelligent rather than haphazard utilization of both military and civilian personnel, and some more definite and specific means of locating trained personnel and of more impersonal methods of assignment. This policy should include (1) the maximum conservation and utilization of the trained military personnel for military purposes; (2) the utilization for industrial mobilization of the wide knowledge of the military art as a result of the universal military training; (3) the continuing interchange of knowledge of manufacturing and control techniques, processes, and forms with those responsible for the content of the training of the universal program; (4) ways of utilizing for industrial mobilization persons within the military training age who are not available because of physical or other reasons; (5) the techniques and methods of a National Service Act in view of the requirements of total war, rather than the less drastic and less inclusive "work or fight" principle of Selective Service; (6) the utilization of women and all men not liable for military service for industrial mobilization or civilian defense.

[8] Fitzpatrick's, *Universal Military Training*, p. 58.

— Helmgartner, Zurich

Model airplane contest in the Swiss Alps

The Industrial-Arts Teacher in a Pupil-Teacher Participation Program

Fred J. Schmidt, Jr. *

Although events during the war made it highly desirable that individuals receive concentrated training in limited performances, there was at the same time, adequate evidence that general training also was essential to the winning of the war and in daily adjustments to life situations. If this is true in the prosecution of a highly mechanized war it may be assumed that a general education, based on wide experiences and learning, as recommended by military leaders, industry, and leaders in education, will be even more important in the adjustments which are certain to be necessary in the years that follow the war.

Although the purpose of industrial arts has frequently been misconstrued, there is growing evidence that we are beginning to recognize its true values in the total picture of properly preparing boys and girls for the complicated decisions and adjustments required in an industrial age. There is growing evidence to show that industrial arts can make a very substantial contribution in that total experience of boys and girls which we call education in and for living.

Psychology and experience indicate that certain physical conditions and certain teaching methods produce the most natural conditions for learning. Psychology and experience indicate that conditions which: (*a*) stimulate life situations as nearly as that is possible, (*b*) permit boys and girls to actually participate in the building of programs, (*c*) give boys and girls an opportunity to start from where they are at the moment, (*d*) permit boys and girls to follow and capitalize upon their own interests, (*e*) make it possible for boys and girls to experiment, (*f*) give boys and girls an opportunity to do some thinking on their own and to be as creative as their abilities will permit them to be; are the most essential conditions under which boys and girls may be guided to an understanding of associations as they exist in life. This relationship to life situations is most nearly produced by the conditions found in a pupil-teacher participation program.

Since the trend is very definitely in the direction of more pupil participation in the planning and carrying on of school activities, since it is generally admitted that the most effective guidance comes through the closer working together of pupils and teachers, we may assume that teachers not now teaching in a pupil-teacher participation program, may in the near future, find themselves expected to do so.

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Having looked at the type of teaching situation which would best prepare boys and girls for the problems in living, it may be well to study the following 11 factors which are essential to the success of a teacher in this type of situation.

Preparation

The program as described gives every indication that to assure its proper functioning a broadly prepared teacher is necessary. Preparation, therefore, is the first vital factor in the growth and success of an industrial-arts teacher in a pupil-teacher participation program. Research has shown that teachers, largely, teach as they were taught. The question then arises, if pupil-teacher participation in an enriched program for living is the goal, are teachers really being trained in such environment or for teaching in such situations or will they be expected to adapt formal training to democratic practices?

Philosophy

Second on the list of factors necessary in the successful growth and achievement of an industrial-arts teacher in a pupil-teacher participation program is the kind of philosophy he holds. In discussing factors essential in a specific type of program, philosophy is extremely basic to our thinking, and it is necessary, therefore, to outline briefly the philosophy of a successful teacher in a pupil-teacher participation program.

In a program of study identical for each pupil, where each pupil follows in exactly the footsteps of every class member, and where the teacher rules supreme, guides and measuring sticks provided by a philosophy are not so essential. In a pupil-teacher participation program, however, where pupils help to make decisions, where pupils make selections of activities, experiment, execute, and evaluate, a teacher must have a very carefully developed philosophy to guide him in order that his total program may have some direction.

Since a pupil-teacher participation program is an effort to adapt school situations, as nearly as that is possible, to life situations, experiences here should be open to both boys and girls, not in segregated but in mixed classes. Since the arts are an admirable medium through which pupil-teacher participation helps to integrate most school content and above all pupil personality, it is extremely important that both boys and girls have an opportunity to participate, because integration of content and experiences is the natural way of learning.

A pupil-teacher participation program should be a situation of opportunity. This is possible only when a plant and a program provide for experiences in many activities. The scope of offerings must be so broad that any pupil may embark upon or begin with his most absorbing interest, and from there through pupil-teacher participation build a strong personality, an individual more capable of comparatively easy and quick adjustment to sudden living changes.

In this co-operative effort on the part of pupil and teacher the development of desirable habits, traits, attitudes, and appreciations must be kept in mind.

To assure successful growth and achievement in a program so broad, so flexible, and so co-operative the philosophy of a teacher of industrial arts must include a broad social outlook and a deep and sincere interest in pupils and their problems. His background of socioeconomic problems must be thorough.

A teacher then to grow and achieve in a pupil-teacher participation program must hold the philosophy that mixed classes are essential, that a large number of offerings are essential, that an enriched program is essential, that the development of desirable attitudes is essential, that pupil participation is essential, that freedom for the demonstration of creativeness is essential, that freedom to experiment and evaluate is essential, that the opportunity for a pupil to begin where he is is essential, and that a program which provides for the learning to adjust to life situations is essential.

The teacher must thoroughly understand that a pupil-teacher participation program is a growing thing, that it cannot be put into practice overnight, but that it must grow at a pace acceptable to many individuals other than himself. This brings us to the third factor of success, namely, the ability of a teacher to sell his program.

Ability to sell the program

Every teacher, to take the deepest interest and to be most efficient in his work, must have a definite feeling of security, a feeling which comes through an assurance of the worth-whileness of his program. He must be able to sell his program to administrators, teachers, parents, and pupils. Broad co-operation, many offerings, and the integration of many school subjects, essential to the successful operation of a pupil-teacher participation program would not be possible without administrative support. This means acquainting the administration with the values of this type of program over that of others.

The program must also be sold to one's

fellow teachers, for its success depends in large measure on the breadth of offerings and upon integration. Unless teachers are sold on the value of pupil-teacher participation, we may find them blocking our efforts rather than giving needed co-operation.

Parents, having been educated through lockstep procedures and dictated programs, will have a feeling that their children can best be taught by methods similar to those applied during their own school experiences. Parents, however, if carefully informed of the purpose of a program and invited to see the program in action seldom raise objections. They must understand that progress in this program is individual and that results are gained through co-operation, guidance, and participation. Parents as well as pupils like to feel they are having a part in the planning. Any co-operative procedure giving this impression will be highly contributive to support on their part.

Parents may not, at first, understand why all emphasis is not placed upon the manipulative experience in order that nicely finished projects result. They have difficulty in seeing that study, research, planning, experimentation, and evaluation are necessary for pupils to gain the broader concepts of the problem and to gain proper appreciations of such associations. They sometimes fail to realize that attitudes and personality development are as much a part of the program as the development of skills.

Then too, it is sometimes necessary to sell the program to a pupil. First contacts with a pupil-teacher participation program many times are confusing to pupils, since there are no set projects to make, no specific program he needs to follow. The freedom granted, the participation solicited, and the guidance offered in drawing out his own interests as a starting point in his development, are at first confusing to him. He has difficulty in knowing how to conduct himself under these new freedoms. When, however, he discovers that this is the natural way to learn he will appreciate the privilege granted him.

Without the support of these groups, and the feeling of security the teacher gains through selling his program, he can attain but moderate success in a pupil-teacher participation program.

Experiences made available to pupils

The fourth factor which enters into the success and achievement of an industrial-arts teacher in a pupil-teacher participation program is the range of experiences which he can provide in his plant. When pupils are permitted choices and a place in the planning of their experiences, offerings must be broad and content must be enriched. Because of the breadth of the program pupils gain experiences in tolerance in the weighing of controversial issues. Problems on living become the core for work in the program.

To continue to make a program as broad as that of a pupil-teacher participation program live, constant effort must be put forth to keep up with the development of new industrial materials and processes and their effect upon our daily living. An understanding of industry is limited in laboratories in which experiences are limited. The teacher should be ever alert to discover new developments, and to readjust his program to meet these changes, for in this way only will he meet the problems of living.

We readily see that a teacher adequately prepared to function in this type of program must be broadly trained. Teacher training institutions cannot afford to make the mistakes of preparing an industrial-arts teacher to teach in but one or two fields or centers. He who knows only wood, only metal, or only any one of the many materials vital to our daily living is hardly prepared for the guidance necessary in a pupil-teacher participation program.

Skill in the manipulation of tools and materials, is necessary. Broad offerings, however, make it necessary for the teacher to have a comprehensive view of social changes, a background in sociology, psychology, biology, educational philosophy, physics, and chemistry.

To be successful in a pupil-teacher participation program the teacher must have the preparation and ability to provide broad offerings in anticipation of the solution of many and varied life problems.

Method

Probably no factor is more important to the success of a teacher in a pupil-teacher participation program as that of method. Method is the manner by which the learning process is guided.

In a pupil-teacher participation program the method is to start with the pupil where he is. Inquiry is made into his immediate interests. The pupil and the teacher, together, decide what the jumping off experience is to be. The pupil according to his ability, assumes the lead in the development of the problem. The teacher acts as guide and counselor or helps the pupil to find someone who can adequately act in that capacity. The point is that the pupil does something with what he knows, or learns something because it bears upon the problem he wishes to solve.

This method requires extreme honesty on the part of a teacher. He must not assume to know all. The pupil and teacher must both be willing to accept challenges, to experiment, and to find answers to problems for which they do not have the answer. A teacher must learn to admit that he does not always know. The important thing is to know from whom or where to secure the information. The teacher is but one of a large number of sources of information.

The freedom allowed, the breadth of the program, and the varied interests of pupils together make for a difficult teaching situation, yet this freedom, this adaptation to individual needs, this integration of experiences, this working together, emphasized in a pupil-teacher participation program is the natural way of doing and learning.

There are definite ways or methods of making teaching more interesting. New literature, visual aids such as films, mounted materials, and exhibits of materials and products are usually available.

Educational tours are very stimulating and instill life into a program. A trip to a blacksmith shop, a foundry, a bakery, glass factory, city electrical plant, a church for a study of architecture or stained glass windows, a grocery or dry goods store, a sewing machine salesroom, or an art gallery has the distinct advantage of making the teaching situation live. Boys and girls thus realize a real need for the experiences they are having in school. They, too, develop appreciations of materials, products, work and social conditions that could in no way, except through personal participation, be made as effective.

Boys and girls thoroughly enjoy watching skilled craftsmen. Such individuals, working in an industrial-arts laboratory for a day or more, whom pupils from the entire school may observe at will, contribute much interest to a study of ceramics, cooking, sewing, personal grooming, work in cold iron, photography, portrait painting, wood carving, or dozens of other experiences which could be demonstrated in an arts laboratory.

Method in the pupil-teacher participation program can provide unlimited opportunity for the development of desirable attitudes on the part of pupils. The need for co-operation in the use of materials and tools, in the planning and solution of problems, offers a splendid opportunity for the development of desirable attitudes.

Although the method provides for co-operative participation in planning by pupil and teacher, there is much need for initiative on the part of the teacher. The teacher must be ready at any time that a pupil's planning falls short of accomplishment, to draw out possibilities, to make recommendations, or to suggest procedures.

The teacher must show a genuine and sympathetic interest in each pupil's undertaking, he must show personal enthusiasm in the classroom, stimulate pupils to enthusiastic endeavor, must demonstrate originality and creativeness himself, and be skillful in planning and organizing his shop procedures.

A teacher, therefore, who begins with the pupil as he is, who demonstrates in capitalizing on pupil interest, who invites pupils to assist in planning, who places emphasis upon learning to live more adequately, who aids pupils in integrating experiences, who has a definite plan for discipline and housekeeping, who strives to make his teaching more interesting, who keeps ever in mind the development of desirable personalities, who emphasizes

living and learning to live as well as the development of skills, and who shows a genuine and sympathetic interest in the problems of pupils, is far on his way to capitalizing on method as a success factor in his growth and achievement as an industrial-arts teacher.

Discipline

A sixth success factor in the growth and achievement of a teacher in a pupil-teacher participation program is the kind of discipline fostered. Discipline is extremely important in any teaching situation but in a laboratory with broad offerings and considerable pupil freedom its importance becomes even more apparent.

Boys and girls permitted to work in an enriched program, on problems of their own choice, find little time for activity of a nature detrimental to good class discipline.

The element of freedom should cause little concern, if the pupils can be brought to understand that freedoms granted always bring resultant responsibilities, and that only as such responsibilities are assumed can the freedom be continued.

Mixed groups and pupil personnel organizations both help to make the problem of discipline a comparatively easy one. As a rule the attendance of girls has a wholesome socializing effect. Boys almost invariably are more manly. The presence of girls also helps to stimulate an attitude of co-operation, in that girls, usually more timid with tools, welcome assistance from the boys.

When the personnel organization functions in a laboratory class, and responsibilities are divided, discipline is largely controlled by the class. A class so organized that freedom and attendant responsibilities become largely its own problem, usually does a fair job in living up to its obligations. Only in extreme cases does it become necessary for a teacher to interfere. The personnel organization presents opportunity for experience in social adaptation on the part of pupils.

Since circumstances in a pupil-teacher participation program are such that proper pupil conduct is extremely essential to proper functioning of the program, it is apparent that discipline ranks high as a factor in the success of an industrial-arts teacher in a pupil-teacher participation program.

Housekeeping

Housekeeping in a pupil-teacher participation laboratory with an enriched program, where numerous materials and supplies and much equipment are available, calls for a careful program of administration. Housekeeping is, therefore, a seventh success factor in the growth and achievement of an industrial-arts teacher.

In a laboratory where pupil participation is the rule, unless careful organization is practiced, the laboratory could shortly become so disorderly as to interfere seriously with desirable progress. Only as all, therefore, realize the need, and assume some responsibility for housekeeping can the job be done without burdening the teacher. Boys and girls who set up their own personnel organization and thereby keep up the laboratory, become much disturbed if something happens to disrupt tool checking, tool upkeep, cleanliness of the laboratory, and order in supply storage. They not only do a good job of keeping up the condition of the laboratory but are alive to needs which they do not hesitate to recommend.

This pride in the assumption of responsibility and a job well done is contagious and one finds that pupils at first reluctant to bear their share of the responsibility soon fall in line or are forced by the group to do their share.

The privilege granted pupils to secure equipment and materials from storage centers as the need arises carries with it attendant responsibilities as all privileges must. A pupil, permitted at will, to secure things he needs, should know that it is his responsibility to choose wisely, make use of materials economically, and always to return equipment and leftover materials to their proper places.

In a laboratory, therefore, of many materials and much equipment, necessary to support adequately a pupil-teacher participation program, efficient organization, efficient handling of equipment and supplies, and laboratory neatness are highly essential to successful growth and achievement of an industrial-arts teacher.

Teaching Load

An eighth factor which has bearing upon the success of an industrial-arts teacher in a pupil-teacher participation program is the teaching load.

If the teacher is not loaded too heavily with duties outside of his regularly scheduled classes and physical facilities are adequate, the problem becomes largely that of proper laboratory organization.

Numbers in a class do not, nor does the degree of homogeneity of the group necessarily call for poor teaching. Whether there is a number beyond which we should go remains a question. Personally I do not like small classes, nor do I like classes of similar I.Q., because neither set true life situations. And when the routine business, yes even some of the teaching of a laboratory class is administered by a pupil personnel organization there seems to be little excuse for holding to the traditional belief that a small class enrollment will necessarily assure good teaching.

Since not all teachers are equally adapted to the problems of administration the teaching load must be considered as a factor in their growth and achievement.

Personality

Sequence in the presentation of these factors has no significance regarding the importance they hold in the total picture of the success of the teacher. In thinking through the problem, this arrangement of the factors seemed to present a logical procedure. To find personality, therefore, presented as the ninth factor in the discussion does not imply that those preceding it are more important.

In a pupil-teacher participation program, where so much depends upon the guidance ability of the teacher, the personality of the teacher weighs heavily as a factor in his success.

Educators recognize the fact that the most desirable personality can grow only through self-expression. It is also recognized that pupils are susceptible to either good or poor personality traits. That is why, in an atmosphere of freedom, of participation, of self-expression it becomes so important to have teachers with strong, desirable, personalities. It is evident that if a pupil-teacher participation program is specifically adapted to self-expression that a strong teacher personality is much more important to success in this type of program than in one of a formal nature.

The personality traits which I shall briefly discuss are not those of any one list growing out of research, but rather those which I feel, through experience in a pupil-teacher participation program, are vital in the success of a teacher in this type of organization.

A wholesome outlook on life so essential to the guidance of pupils in enriched programs with freedom for self-development is limited, unless the individual develops for himself a philosophy which will give him a definite purpose and a singleness of aim.

Administrators invariably rank good judgment near the top of the list as a most important personality trait. In a situation of much freedom, pupil participation, and broad experiences, many judgments need to be made quickly. A teacher who makes wrong decisions and needs continually to retract them soon loses the confidence of his pupils.

In a pupil-teacher co-operative program, where the philosophy provides for adaptation to a rapidly changing society, adaptability as a teacher personality trait is not only important but absolutely essential.

Where many opinions are considered in the solution of pupil problems a teacher cannot, if the philosophy is to function, impose his point of view. He must approach each problem with an open mind and permit all opinions to be weighed equally. Open-mindedness, therefore, is a personality trait ranking high in the factor of personality for a teacher in a pupil-teacher participation program.

Many interests, with teacher enthusiasm for the promotion of all of these interests, will inspire pupils to undertake worthwhile problems, and encourage pupils, providing the teacher is pleasant and agreeable, to solicit and accept guidance.

A high degree of co-operation is essential if pupils and teacher are to work together,

that is, the teacher must know how to be co-operative and also how to secure the co-operation of others.

To be able to teach pupils to do their own thinking and to assume responsibility for their own conduct, the teacher must be emotionally developed. To be susceptible to moods develops uncertainty and confusion in pupils. They never quite understand what the teacher expects and therefore cannot trust his immediate point of view.

A teacher in a pupil-teacher participation program must be progressive, that is, he must be willing to keep himself informed of changing conditions. He must be willing to accept change and provide for it in his program when necessary. He himself must have the experimental attitude. He must never permit his program to become static.

A fine sense of humor is not absolutely necessary but if a teacher has it or can develop it he will find that it provides for smoother exits out of tight places; it will provide that little something which changes an embarrassing situation into a non-important issue.

Personality is contagious. When, therefore, the possession by a teacher of good or bad personality traits, determines almost wholly the attitudes pupils will take toward their problems, we may assume that the amount of stress placed on the development of desirable teacher personality is not misplaced. As a factor, therefore, in the success of a teacher in a pupil-teacher participation laboratory where guidance is the method of instruction, personality rates high as a factor in the growth and achievement of an industrial arts teacher.

Attitude of the Teacher Toward Evaluation of His Work

Since the accomplishments of a teacher are evaluated whether he wills it so or not we must consider the evaluation of his accomplishments as a factor in his success.

If a teacher realizes that there are certain obvious limitations to his self-evaluation he at once must admit that appraisal through the eyes of others may have much of value for him. If an industrial-arts teacher will weigh, with an unbiased mind, evaluation by pupils and supervisors, he can gain much from their help. Some teachers always have their pupils help to evaluate a teaching situation. These teachers are strong teachers, because of their sincere effort to remedy mistakes, in order that they may more adequately meet the needs of their pupils. Pupils are always happy to help in such evaluations and will take time to frankly discuss procedures and content which have been helpful to them. They are also free at any time to offer recommendations.

A teacher, however, who takes evaluation as personal criticism is doomed, because such attitude toward evaluation lowers his feeling of security.

Efforts to Grow in Service

Although growth-in-service as a factor may seem far removed from actual classroom experiences yet it certainly is a factor in the growth and achievement of an industrial-arts teacher. Reference was previously made to keeping up with new industrial materials and processes. This may apply equally to keeping informed regarding new practices in education. It is questionable as to whether a program will continue to grow if the teacher does not.

To grow in service the teacher must have an overview of the whole school program from elementary grades through high school in order to appreciate the problems involved in co-operative endeavor.

Teachers in service derive many benefits through professional organization. This it seems, would obligate them to at least keep up membership, but preferably to become active members of such organizations.

Good ideas, teaching helps, or methods successfully applied should be passed on to the profession. This means occasional writing or presentation of ideas before groups.

A carefully planned reading program designed to give the teacher a broad acquaintance with developments in his own field, and with society in general, gives the teacher an overview so essential in the broadest possible development of a pupil-teacher participation program.

Any effort devoted to improvement in teaching capacity while in service would seem to constitute a very definite factor in the achievement and growth of an industrial-arts teacher.

Vocational Opportunities in the Community

*Jerome Leavitt**

This survey was made to discover the existing job opportunities in the community served by the Roslyn, L. I., Public Schools, and to ascertain what training could be offered to fill some of these, wholly or in part.

All the material presented has been gathered and worked out with the hope that someday it can be put to use, or in any event, furnish a pattern for others to work from.

Sample forms are included. A great deal of information not recorded could be derived by going over the material recorded in these forms.

Description and Spread of Community

a) This community is of the average residential, small business type, with a large number of commuters.

The government is of the county-township type, with the schools administered as a district. In this district, it is possible to provide good educational and civic opportunities.

b) Villages (geographical areas) making up the community: Roslyn Estates, Albertson, Roslyn Heights, Greenvale, Roslyn Village, Roslyn Harbor, East Williston, Williston Park, Glen Head, Old Westbury, East Hills, Glenwood Landing, Norgate, Red Ground, Rollingwood, Bulls Head.

All these are small in area and population. Some of these have their own elementary schools, but all of them send their students to a Central High School.

c) *Personality* (*The people themselves*). The people in these communities want good education for their children along general educational lines, and I believe that they would wholeheartedly back a good program of vocational education.

d) *The population* consists of native and foreign-born along with a number of the first and second generations. Italy, Poland, and Germany are well represented. All religions are represented, but with very few Jewish people.

Existing Facilities for Education

a) *Preschool:* There is some work being done in preschool education. This takes form in nursery school classes for children whose mothers work during the day, and in regular kindergarten classes for all children before they enter the first grade.

b) *Elementary School:* Good elementary schools are provided that furnish opportunity for a great deal of growth on the part of the children. The work is varied and provides opportunity for all.

c) *Junior-Senior High School:* The junior-senior high school work is gradually changing from college preparatory so-called academic work to that of a practical general nature. It still can be improved by putting in some vocational work for those children who could benefit from it.

d) *Postschool and Adult Education:* Very little is done in the way of postschool and adult education with the exception of

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a class here or there, or a group conducted by some organization. Some work of the vocational type was done in connection with the National Defense program.

e) Vocational Education and Apprenticeship: Other than the defense work in aviation mentioned, and a little of the industrial-arts work, nothing is done to prepare students for actual work in industry, although a program is offered in business education.

A few local mechanics offer opportunity to apprentices.

f) Other Organizations and Facilities: Besides the facilities mentioned, there is a limited amount of work being done along the recreational lines.

Survey of Actual Employment Opportunities Inside and Outside the Community

a) Classified list of business and industry in the community:

Agriculture	3
Skilled trades or occupations	16
Distributive occupations	70
Semiskilled trades	38
Commercial	11
Professional service	22
Transportation and communication	9
Personal service	16
Civic social	18

Rather than list each business or industry individually, the total number in each has been given.

b) A large number of the working people are commuters. These people are employed both in business and industry. It would be impossible to list these unless a house to house survey were taken, which at this time is impossible.

c) Employment is now possible and could be increased in the areas of retail selling, skilled mechanical trades, food trades, and household helpers.

Vocational Choice of High School Students

a) Tabulated sample of students' vocational interests. This is a sample report taken of about one hundred tenth year high school students, and includes both boys and girls.

Occupation	*Girls Interested*	*Boys Interested*
Lawyer	3	4
Priest or minister	0	0
Doctor or surgeon	2	2
Dentist	1	1
Teacher	6	1
Nurse or social worker	8	0
Stenographer or typist	15	1
Bookkeeper	3	2
Office clerk or office boy	3	3
Grocery store clerk	1	9
Department store clerk	12	8
Salesman or buyer	7	3
Gas station attendant	0	13
Farmer	1	10
Gardener	1	14
Carpenter	1	14
Cabinetmaker	0	18
Plumber	0	7
Electrician or lineman	0	20
Auto mechanic	0	20
Truck driver	0	17
House painter or decorator	0	10
Upholsterer	1	1
Waiter or waitress	7	1
Cook	16	2
Maid	3	0
Dressmaker or tailor	12	2
Orchestra or band	5	11
Commercial artist or interior decorator	13	7
General housekeeper	5	2
Librarian	1	0
Writer or author	4	1
Reporter or journalist	3	0
Beautician	4	0
Dramatics or actor	4	0
Singer	2	0
Model	4	0
Aviation stewardess or mechanic	1	6
Policeman, policewoman, or dectective	1	1
Architect	1	4
Photographer	0	1
Seaman or coast guard	0	1
Mason or bricklayer	0	2
Air conditioning expert	0	3
Radio operator or mechanic	0	5
Animal trainer	0	2
Welder	0	4
Television expert	0	1
Printer or bookbinder	0	1
Forest ranger	0	2
Engineer	0	2

b) Tabulated Sample of Students' Likes and Dislikes: In this survey, we had 49 girls and 54 boys from the tenth year reporting; their ages ran from 14 to 18 with an average age of 15 plus for the girls and 16 for the boys.

In the order mentioned the school subjects, gym, woodshop, science, and metal shop were favorites with the boys; and gym, English, music, cooking, and sewing with the girls. While the least popular subjects with the boys were languages, metal shop, English, and mathematics and with the girls mathematics, science, woodshop, and metal shop.

c) Other conclusions from sample: In the report of the vocational interest of this group of tenth year students, the girls showed interest in 32 different occupations and the boys showed interest in 42. There were 130 occupational interests reported for the girls and 260 for the boys.

It is noticeable that very few boys or girls voiced preference for the professions. Thought was shown on the part of the students when out of most of their choices they chose at least one practical skilled line of work.

Guidance as a Way of Working

a) Background in the Elementary School: Guidance activities in the elementary school are not conducted by one person, but by the entire school staff, under the direction of the school principal. Each teacher has something to offer in her field or to the grade in her charge. Care is given that all work offers opportunity for expression, recreation, exploring, and therapeutic values.

The elementary work in this community strives to do this sort of thing.

b) Guidance Itself in the Jr.-Sr. High School: In the junior-senior high school, the work is headed up by a person trained in vocational, educational, social, and civic guidance. However, the majority of the guidance work is and will be carried on by the individual teacher, as she knows more about her field of work or subject, and has more intimate contact with the individual student.

Giving children opportunities to work in many areas is one of the means of giving vocational guidance and certainly is more valuable than reading about it in books. Educational guidance is given throughout the child's school life, and deals with assisting in choosing their schoolwork. In our social-civic guidance, we try to train boys and girls to think properly for themselves.

Sample Curriculums that Could be Put in the High School to at Least in Part Fulfill These Needs

As these curriculums were made up, consideration was given to the vocational opportunities afforded in the community and the vocational preferences of students.

a) Vocational-Technical Curriculums

Electricity

Ninth Year		*Tenth Year*	
English I	5	English II	5
Algebra I	5	Algebra II	5
General Drawing	5	Technical drafting	10
General shop	5	Electrical laboratory	10
Health and Physical Education	2	Health and Physical Education	2

Ninth Year		*Tenth Year*	
Social science and history of industry	5	Business practice industrial economics or commercial geography	5
Natural and physical science	10		
Electives	3	Electives	3
Eleventh Year		*Twelfth Year*	
English III	5	English IV	5
Plane geometry	5	American history	5
Physics	7	Trigonometry	5
Electrical laboratory	10	Electrical laboratory and shop	15
Electrical theory	5	Health and Physical Education	2
Health and Physical Education	2	Electives	8
Electives	6		

NOTE: Changes can be made in certain subjects if deemed advisable.

Building Construction

Ninth Year		*Tenth Year*	
English I	5	English II	5
Algebra I	5	Algebra II	5
General shop	5	Architectural drawing	10
Health and Physical Education	2	Health and Physical Education	2
Social science and history of industry	5	Carpentry	10
Natural and physical science	10	Business practice industrial economics or commercial geography	5
Electives	3	Electives	3
General Drawing	5		
Eleventh Year		*Twelfth Year*	
English III	5	English IV	5
Plane geometry	5	American history	5
Millwork and interior trimming	10	Trigonometry and surveying	5
Architectural drafting	10	Health and Physical Education	2
Physics	7	Plumbing and electrical practice	5
Health and Physical Education	2	Architectural drafting	10
Electives	1	Carpentry, house section	5

NOTE: Changes can be made in certain subjects if deemed advisable.

Farming and Gardening

Ninth Year		*Tenth Year*	
Same as automotive service		English II	5
		Related mathematics	5
		Related science	5
		Gardening	20
		Health and Physical Education	2
		Electives	3
Eleventh Year		*Twelfth Year*	
English III	5	English IV	5
Related drawing	5	American history	5
Care of livestock	20	Greenhouse and grounds	20
Related science	5	Related business practices	5
Health and Physical Education	2	Health and Physical Education	2
Electives	3	Electives	3

Trades for Men

Choose electrical, woodworking, or metal trade and follow it through.

Ninth Year		*Tenth Year*	
English I	5	English II	5
General mathematics	5	Related mathematics	5
General science (Emphasis on biological)	10	Related science	5
General drawing	5	Electric shop Millwork and cabinet-making or machine-shop practice	20
Fine and graphic arts	5		
Health and Physical Education	2	Health and Physical Education	2
Electives	3	Electives	3
Social science and industrial history	5		
Eleventh Year		*Twelfth Year*	
English III	5	English IV	5
Related drawing	10	American history	5
Electric laboratory Sheet metal or furniture making	20	House wiring Advanced machine shop or carpentry	20
Health and Physical Education	2	Related business practices	5
Electives	3	Health and Physical Education	2
		Electives	3

Trades for Women

Choose tea room management, household management, or dress design and follow it through.

Ninth Year		*Tenth Year*	
English I	5	English II	5
General mathematics	5	Related science	5
General science (Emphasis on physical)	5	Related art	5
Fine and graphic arts	5	Cafeteria operation Nutrition and nursing, or clothing and representation	20
Health and Physical Education	2	Health and Physical Education	2
Industrial arts	5	Electives	3
Social science	5		
Electives	3		
Eleventh Year		*Twelfth Year*	
English III	5	Electives	3
Related mathematics	5	Health and Physical Education	2
Related design	5	English IV	5
Restaurant management Household management Clothing and costumes	20	American history	5
Health and Physical Education	2	Tearoom supervision Diets and child care Costume design and illustration Related business practice	20
Electives	3		

Business Curriculums

Choose bookkeeping, secretarial practice, or retail selling and follow it through.

Ninth Year		*Tenth Year*	
English I	5	English II	5
General science	5	Economic geography	5
Social science	10	Typing I	5
Math and algebra	5	Business adjustment	5
Home and industrial arts	5	Personality I	5
Fine arts and music	5	Health and Physical Education	2
Health and Physical Education	2	Bookkeeping I	5
Electives	3	Business arithmetic	5
		Electives	3
Eleventh Year		*Twelfth Year*	
English III	5	English IV	5
Typing II Shorthand I Bookkeeping I and accounting, Bookkeeping I Introduction to retailing	10	American history	5
		Typing III Shorthand II Bookkeeping II and III Retail selling and merchandise information	10
Economics	5	Business law	5
Personality	5	Secretarial or clerical practice	5
Elective in another business field	5	Advanced elective in major	5
Elective in industrial or arts field	5	Health and Physical Education	2
Health and Physical Education	2	Electives	3
Electives	3		

General Occupational

Terminal Courses for Both Boys and Girls

Ninth Year		*Tenth Year*	
English I and social studies	10	English and social studies	5
Science and mathematics	10	Science and Mathematics	5
Health and Physical Education	2	Health and physical education	2
Industrial arts	5	A major is chosen from any vocational field that the student can profit by and one half the school day is spent in this work	20
Printing and mechanical drawing or fine arts	5		
Home arts	5	Related science, mathematics or drawing	10
Electives	3		
Eleventh Year		*Twelfth Year*	
English	5	English	5
Major	20	American history and civics	5
Related work	10	Major	20
Health and Physical Education	2	Related work	5
Electives	3	Health and physical education	2
		Electives	3

NOTE: The related work may be taken in another field if it will assist the person to better prepare himself for the type of work that he is desirous of doing. When a student has become proficient in his work, he will be allowed to go out and take a part-time job, or become an apprentice. These courses will be so set up that he will be able to leave during the year if an opening presents itself.

FORMS FOR USE IN THE VOCATIONAL SURVEY

Occupational Survey
Vocational Advisory-Board Department of Education

Enumerator's Assignment Sheet

Assignment No.....Name of enumerator.....
Name of firm.....Kind of business.....
Address of firm.....Tel. No.....
Name and position of person to be contacted.....
Date assignment was received.....Date completed.....
Enumerator's signature.....

Occupational Survey-Vocational Choice

1. Name..... Sex..... Grade..... Age.....
2. Father's name.....Place of birth.....
3. Mother's name.....Place of birth.....
4. Father's occupation.....
5. Mother's occupation.....
6. Please place a check (x) behind each of the following school subjects in the column which best describes your personal interest in them.

Leave blank any subjects which you have never studied.

Subjects	*Very much interested*	*Some interest*	*No interest*
Mathematics			
English			
Science			
Language			
Woodshop			
Metal Shop			
Crafts			
Art			
Music			
Sewing			
Cooking			
Mechanical drawing			
Gym			
Typewriting			
Shorthand			
Bookkeeping			

Please place a check (x) behind each of the following occupations in the column which best describes your personal interest in that occupation as a possible future for yourself.

Occupations	*Very much interested*	*Some interest*	*No interest*
Lawyer			
Minister or priest			
Doctor			
Dentist			
Teacher			
Nurse			
Stenographer			
Bookkeeper			
Office clerk			
Grocery store clerk			
Department store clerk			
Salesman			
Gas station attendant			
Farmer			
Gardener			
Carpenter			
Cabinetmaker			
Plumber			
Electrician			
Auto mechanic			
Truck driver			
House painter			
Upholsterer			
Waiter or waitress			
Cook			
Maid			
Dressmaker or tailor			
Orchestra			
Commercial artist			
General housekeeper			

Write in any additional choices in the following:

_____

_____

_____

_____

_____

The Interview—The What, How, Why, When, Where, and Who

*R. T. Craigo**

Practically every foreman, instructor, superintendent, employment manager, counselor, principal, director, or personnel manager frequently *interviews* people.

Although all of us interview, very few of us really know what an *interview is;* that is, the *what, how, why, when, where, and who of the interview.*

The first basic principle is that the interview is a learning process and therefore should observe the basic laws of learning — readiness, exercise, results.

Readiness: The person interviewed must be in the proper state of mind (readiness). No matter whether he is being "called for disciplinary reasons," or "receiving advisement," or "applying for a job," or "to settle a complaint," the first step as in all learning should always be "readiness."

Exercise: The value of an interview is in direct proportion to how much the person interviewed takes an active part (exercise). If he sits or stands passively, he may "take it" but it doesn't "stick" or amount to much.

Results: If the interview produces actual results, it was worth while; if not, time and effort are wasted.

Illustrations follow:

Readiness: (*good*) "Sit down; hang up your hat; have a seat. What brings you here? What is your problem? Can I help you?"

Exercise: (*good*) "Have you any solution for your problems? What were you doing? How can you improve your case? Have you tried to get help from someone else? Can I help you?"

The interviewer then proceeds to assist the person interviewed state his case, troubles, desires, complaints, experience, qualifications, etc. (In the same way, the good teacher first learns what his student knows, and only then can he teach him what additional knowledge he needs.)

The more the interviewer gets the interviewed person to work out his own problems, the better the interview.

What the interviewer puts across to the person interviewed is of value only as far as the person interviewed *learns* it. Learning calls for exercise.

*Assistant Director, Dunwoody Institute, Minneapolis, Minn.

Results: (*good*) "Well, what have we accomplished? Does this solve your problem? Where do we go from here? Just what do you plan to do about it?"

The value or results of the interview depends on whether or not the person interviewed has learned something. If he was in trouble, has he learned why and how to remedy the trouble? If he is after advisement or counseling, has he learned something he can do about it? If he is after a job, has he learned what he needs to know about your proposal?

If he has learned something about himself or the problem, only then can you expect *results*.

Interview Follow-Up

Most interviewers make the same mistake; they fail to use a *follow-up*. In general, interviewers "dish out their stuff," the interviewed person walks out, and both parties have wasted their time.

Never fail to close an interview by arranging for a *follow-up*.

Some Good Steps: "Won't you drop around again or telephone me how you came out? What further help can I offer you?, etc." Good interviewers often ask for a definite report, call, or result to be made on a definite date.

Emotional Problems

In the course of the interview, the good interviewer is on the lookout for *emotional problems*. If the person interviewed is angry, disappointed, discouraged, or upset emotionally, the interviewer may often arrange for a second interview. He will say: "You are upset; why not come back tomorrow?" Or "why not sleep over it and come back again when we can handle your problem better?"

In fact, in emotional cases, the interviewed person is usually not in *readiness* at the first interview.

Interviewer Needs Aid of Others

The good interviewer will very soon learn in each case if there are phases that should be referred to or handled by others. A few pertinent suggestions on to whom to go and what to secure elsewhere will often give superior results, and save time and energy.

Maybe the interviewer should first contact the person's superior, or some other concern, department, or agency. Sometimes the interviewer handles a "hot case." Some interviews never should have been held!

Brief History of Industrial Arts and Vocational Education

*Erhard F. Wendt**

(*Continued from page 154 of the April, 1946, issue*)

A noteworthy attempt at a solution of the problem of utilization of hand training in the general education of the young was made by Charles Leland in the past two decades of the nineteenth century. Leland maintained that art work contributed to the general education of the child. He considered art work a phase of industrial life particularly adapted to the child's nature. A child in the early grades is interested in the ornamental type of work. He can mold pottery, develop designs, and draw. Mechanical drafting and construction work with wood and metal are placed in the advanced grades.

The workshop or "learn by doing" idea had an important effect on the teaching of other subjects. The first change took place in the teaching of the sciences. It was found that laboratory or manipulative work was necessary for a better understanding of the book learning. Mathematics, geometry, mechanics, history, and some branches of calculation lend themselves easily to the application of manual activity.

Vocational Education

Although the vocational aspects of industrial education had always been recognized, the principal reason for their adoption had been the cultural value. There had been widespread disagreement as to whether the general or vocational aspects were the more important. That disagreement now began to give way to the recognition that there was a place for both in the educational scheme. The question now was when the one should stop and the other begin. Various vocational schools had been established, but the introduction of manual training into the public schools had been mainly based on the argument that its addition afforded a broader education and an appreciation of the mechanics arts. At the beginning of the twentieth century, the vocational aspects began to be emphasized. Important as the contribution of Leland and Todd may have been:

> . . . what seems to have been by far the most influential agency in inaugurating a definite movement for vocational education in both general and special schools was the Massachusetts Commission on Industrial and Technical Education, appointed in 1905, to investigate the needs for education in the different grades of skill and responsibility in the various industries of the Commonwealth.[20]

However, neither the growth nor the results of the manual training movement had proved satisfactory, as revealed in the foregoing study. The further decay of the apprenticeship system, increased competition both international and local, and the shortage of skilled workmen were prominent reasons for the stimulation of vocational education.

Various commissions made studies, and in their reports all pointed out the failure of the manual training movement, and advocated the introduction of vocational education in the public high schools and in separate vocational schools. The only dissenting opinion was that made by various trade-unions, which felt that an oversupply of skilled workmen would damage their wage scale. A few educators were suspicious of the manufacturers because they felt that the manufacturers were advocating vocational education in order that a lower wage scale might be imposed on their employees.

The growth of vocational education about 1910 may be attributed to six factors. First, there was the recognition of the fact that the manual training movement furnished inadequate vocational training. Second, compulsory education laws had brought to the schools, especially in the higher grades, a larger group of children that did not care for or were unfitted for literary or scientific pursuits. If education was to benefit this group for later life it must provide a preparation for occupation in industry. Third, the continued transfer of manufacture from home to the factory, and the resulting shift of population from the rural to the urban centers tended to minimize the value of a child's domestic experiences so far as they were related to vocational training. Fourth, opportunity for apprenticeship training was at a premium because of the factory system and the efforts at limitation by trade-unions. Fifth, the increasing demand for skilled labor due to both the growth of this country and the increasing number of factories demanded an ever increasing specialization. Finally, there was an increasing demand for educational opportunities by the laboring class in fields

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[20] L. F. Anderson, *Hist. of Manual and Industrial Sch. Ed.*, p. 199.

which would help them and their children earn a better living.

Negro and Indian Schools

Many of the trade or industrial schools begun in the early twenties of the nineteenth century had died out. Those that survived had developed into higher technical schools. An encouraging factor in the growth of the vocational school was the success which was experienced with the education of the negro. At the close of the Civil War many emancipated slaves were mingled with the white population of the country. Because of their former habits, conditions of servitude, lack of knowledge, and their new status in a democracy, it was found necessary to give them an education which would enable them to support themselves. General S. C. Armstrong, in 1868, organized the Hampton Normal and Agricultural Institute at Hampton, Va. This school for the education of the negro has been characterized as the first industrial school of any importance in the United States. The idea of the founder was to educate selected negro youth who in turn would teach and lead their people. The success of this school led to the establishment of the Tuskegee State Normal and Industrial Institute in 1870, and of a school for Indians at Carlisle, Pa. in 1878. The Tuskegee State Normal and Industrial Institute was opened under the direction of Booker T. Washington, a former student of Armstrong.[21] Haskell Institute in Kansas was opened in 1884. It was the success of these schools for the Negro and Indian that prompted an increased demand for schools of a similar vocational nature for the white children.

The Vocational movement of the opening twentieth century is reflected not only in the establishment of important privately endowed schools, such as the David Ranken School of Mechanical Trades in St. Louis in 1907, and the Wentworth Institute in Boston in 1911, but also the establishment of public institutions, for example, the Philadelphia Trades School in 1906, the Milwaukee School of Trades in 1907, and the Columbus Trades School in 1909. The same period is marked by the organization of state systems of industrial schools or of aid to schools, such as that of Massachusetts in 1906–09, New York in 1908, and Connecticut in 1909.[22]

In the early decades of the twentieth century there was still little unification of opinion as to the purposes of industrial education. As evidence of this fact, one engineering dean said:

> We ought to get an accurate definition of what we are trying to do. If the manual training high schools are trying to solve the problem of industrial education, they ought to say so; and if the work is cultural, they ought to say so.[23]

In 1913, Professor David Snedden declared in an address:

> Much of the restlessness today prevalent with regard to manual training is obviously due to the fact that, in the last analysis, we are only guessing as to where we are going with it. We do not know just what purpose is to be achieved.[24]

In the first two decades of the twentieth century three trends, important to the vocational education movement, developed. First, there were the contributions to the theory of industrial education. Second, progress was made in the determination of the part of vocational education that the school can take, and finally, governmental support of vocational education began to take shape.

Changing Philosophies

One of the most outstanding contributions to the theory of industrial education was made by John Dewey and his associates at the University of Chicago. Dewey pointed out the justification of this type of education on psychological grounds, when he said:

> The child's knowledge originates and develops in connection with his doing. Industrial occupations gratify his native tendencies to explore, to manipulate tools and materials, to construct. They reduce the gap between life in school and out. They make possible that co-operative activity so essential to the social education of the child.[25]

The aim of the early vocational schools had been to eliminate the necessity of apprenticeship. The founders of these vocational schools found themselves confronted with several problems. Chief of these was the fact that attempts to duplicate factory conditions and equipment were expensive. Students in vocational schools were children of the working people whose families had very limited financial means. Then there was the disposal of manufactured articles.[26] The ever increasing division of labor in factories made it less necessary that a workman knew all of the details or processes in a trade.

To meet the special needs in a trade, apprenticeship or corporation schools were developed by employers who felt it worth while to educate their workmen for more efficient performance in their particular jobs. A shortage of skilled labor prompted other employers to establish schools.

The co-operative school was established to give students practical experience in a factory. Part of each day was spent in school and the balance in a co-operating factory. This type of school was established especially for engineering students. The principal difficulty with this type of education was that the nature of the work was necessarily determined by the factory owner and correlation with schoolwork was achieved with great difficulty. This system was opposed by the American Federation of Labor on the grounds that it took the control of education out of the hands of the public.

The continuation school was another attempt to solve the problem of industrial vocational education. Apprentices were required to attend nine hours each week. Instruction was concluded about seven o'clock in the evening, making it possible for each apprentice to retain much of his leisure time. This plan proved to be very successful and was given legislative support in many states. The idea for this type of school was taken from Germany, where Dr. Kerschensteiner had successfully developed the Munich system of continuation schools.

The evening schools for mechanics had been established early in the nineteenth century, and were now experiencing a revival at the same time that the continuation school was flourishing. The Franklin Institute of Philadelphia in 1824, the Ohio Mechanics Institute in 1828, and legislative action in Massachusetts in 1870 were the outstanding schools offering evening schools in the nineteenth century. In the revival of the evening school it was advocated that classes should be taught by a corps of teachers hired especially for that purpose.

The trend toward part-time education may be attributed to the following reasons: practical training is acquired in the shop or factory which circumvented one of the great difficulties encountered in systematic vocational education, the problem of maintenance for the student was solved by his being able to work at the time that he was going to school, the work done is actual trade experience rather than formal exercises, and the necessity for much expensive equipment is eliminated.

— Photopress, Zurich

Launching a model airplane in a contest held in Switzerland

[21] *Ibid.*, p. 216.
[22] *Ibid.*, p. 216.
[23] *Addresses and Proceedings of the National Educational Ass.* (1910), p. 736.
[24] *Manual Training Magazine* (1913), p. 371.
[25] Dewey, John, *Democracy and Education*, p. 367.
[26] Anderson, L. E., *Hist. of Manual and Industrial Sch. Ed.*, p. 226.

Industrial-Arts Equipment List—Comprehensive General Shop

*F. C. Finsterbach**

This list is intended to guide the superintendent, principal, school architect, purchasing agent, or teacher in the selection and purchase of basic equipment for the industrial-arts comprehensive (six area) general shop.

In quantity, it is based upon the needs of a class of 24 students, grouped to work more or less simultaneously in the different areas indicated. Any given quality standards are based upon experienced judgment and such economic factors as durability, suitability, and reliability of manufacturer. Where brand or trade names appear, they are to be considered only as guiding standards, not as absolute selections. Unless otherwise specified, the term "or equal" may apply to all items. Approximate costs are given, although these may no longer apply when ceilings are abolished.

Typical specifications and ordering procedures are included for reference. Since many items of equipment can be made in the shop or acquired from salvage, a separate list of this type of equipment is attached. These items are also starred (*) throughout the general lists.

Each unit is *not* self contained because many tools are interchangeable. If all of the basic units are not provided for during the first year, then selection of the *common* equipment and tools must be made from the remaining lists.

For policies governing the purchase of equipment, several alternatives are suggested for departments lacking sufficient funds for the establishment of all units of work at once.

1. Equipment may be purchased on a three-year budget plan. In following this plan, the most essential large general equipment could be obtained the first year with the other equipment being added in the next two succeeding years.

2. The teacher might be employed during all or part of the summer to make some of the cabinets, tables, and other equipment or devices needed for the shop.

3. Full equipment might be purchased for the establishment of *two* complete units of work the first year, with *two* more units being added during each of the succeeding years. If this is done, the metal unit (complete) and the woodwork unit are suggested for the first year development.

BASIC LARGE EQUIPMENT

Comprehensive General Shop — 6 Units

Quantity	*Description*	*Approx. cost*
2	Benches, 4-pupil position	$ 200
4	Benches, 19 x 24 x 33 high	240
1	*Bench, foundry	25
1	Bench, sheet-metal stake bench	75
1	Bench, electric or utility	75
1	Saw, 8 or 10-in. circular floor model	100
1	Drill press, floor model	75
1	Power grinder, pedestal model	50
1	Gas or coal forge	25
1	*Pottery kiln	250
2	*Textile looms	50
1	Screw cutting lathe, 9 in. with accessories	350
1	Wood lathe with accessories	100
1	Jig saw, with stand	75
1	Band saw, floor model	150
1	*Printing press and equipment	350
1	Planning table 72 x 34 x 30, linoleum top	40
6	Shop stools 20 in. high	12
1	*Clay storage cupboard	20
1	*Potter's wheel	90
1	Jointer 6-in.	100
1	Filing case, letter size, 4 drawer	35
1	Filing cabinet, five flat drawers over two legal size drawers and base	150
1	Filing case, card index 3 x 5	7
1	Air compressor spray unit ¼ h.p.	45
1	Rotary machine all-in-one	60
1	Squaring shears, 30 in.	160
1	Bar folder	100
1	Buffing machine	25

SUMMARY: Large equipment maximum cost $3,000

METAL WORK UNIT

Includes elements of: art metal, ornamental iron and forge work, metal turning and spinning, simple automotive maintenance, foundry, sheet metal and plumbing. While each unit is outfitted separately, some items are interchangeable and hence do not appear in more than one list.

Art Metal Equipment

Quantity	*Description*	*Approx. cost*
3	Jeweler's saw frames, 4-in. frame	$ .95
1 pr.	Tin snips, scroll pivoter, Wiss No. 9-X	4.50
1	Wire gauge, U. S. Standard B & S No. 688	2.50
1	Soldering iron, electric 3/16-in. copper tip, Stanley or equal	6.96
1	Bunsen burner	2.25
1	Chasing hammer, 1-in. face No. 4 Brodhead-Garrett	1.25
1	Forming hammer, 10-oz. No. 35 Brodhead-Garrett	2.15
1	*Dogwood mallet No. 33 Brodhead-Garrett	.72
1	*Dogwood mallet No. 31 Brodhead-Garrett	.67
1	*Dogwood mallet No. 32 Brodhead-Garrett	.82
1	Anvil base No. 575 Brodhead-Garrett	1.89
1	Forming anvils No. 540 Brodhead-Garrett	.76
1	Forming anvils No. 541 Brodhead-Garrett	1.50
1	Forming anvil No. 547 Brodhead-Garrett	.80
1	*T* stake No. 577 Brodhead-Garrett	3.42
1	*Lenk No. 30 automatic alcohol blowtorch	3.00
1	Hand drill, Stanley No. 617	2.50
1	Plier, round nose 6 in. Krouter No. 1611	1.00
2	Plier, needle nose 6 in. Krouter No. 1671	2.50
1	Plier, diagonal cutting 5 in. Krouter No. 450	1.60
1	Plier, flat nose 6 in. Pexto	1.05
1	Pin vise, Lowell type	2.00
2	*Crimping blocks No. 644 Metal Crafts Supply Co.	1.75
1	*Plate molds, wooden 4 in. diameter Metal Crafts Supply Co.	1.50
1	*Plate molds, wooden 5 in. diameter Metal Crafts Supply Co.	2.00
1	*Plate molds, wooden 6 in. diameter Metal Crafts Supply Co.	3.00
1	Ball-peen hammer, 8 oz.	1.40
1 set	*Chasing tools, Set No. 248, 12 pr., Metal Crafts Supply Co.	5.00
1 set	*Backgroumd tools, Set No. 249, 6 pr., Metal Crafts Supply Co.	10.00
1	Brush, hand, No. 293, Metal Crafts Supply Co.	.45
1	*Glass dish, with cover, for etching	.75
1	*Pair rubber gloves	2.00
1 set	Swiss-Pattern needle files 5½ in.	3.20

References: (1) Brodhead Garrett Co., Cleveland, Ohio; (2) Metal Crafts Supply Co., Providence, R. I.; (3) American Handicrafters, New York City; (4) Lewis & Company, Watervliet, N. Y.; (5) Wm. Dixon Co., Newark, N. J.

Quantity	*Description*	*Approx. cost*
1 gr.	No. 2/0 Jeweler's saw blades	$ 4.50
1 q.	Crocus cloth	1.50
10 lin. ft.	Sheet copper, 12 in. wide, 36 gauge	1.00
10 lin. ft.	Sheet copper, 12 in. wide, 20 gauge	4.70
5 lin. ft.	Sheet brass, 12 in. wide, 20 gauge Colonial Alloy	3.15

*School Eighteen, Buffalo, N. Y.

*Also listed in individual units.

Quantity	*Description*	*Approx. cost*
1 lb.	No. 3/0 steel wool	.48
1 pt.	Clear lacquer	.50
1 qt.	Lacquer thinner	.45
1 pt.	Metal etching mordant	.90
1 lb.	Tripoli polishing compound	.15
1 lb.	Rough polishing compound	.25
1 lb.	Liver of sulphur	.60
6	Blanks, nickel silver, ½ by 6 in., 16 gauge	4.20
1 pt.	Black asphaltum	.20
SUMMARY — *Art Metal:*		
All items including initial supplies		104.58
Less shop made or improvised items		31.11
Balance, including 1 yr. initial supplies		73.47

Ornamental Iron — Work Unit

Quantity	*Description*	*Approx. cost*
1	Grinder ½ h.p., 2-wheel fully guarded pedestal	$ 55.00
1	Forge hand blower with coal bin No. 1146-S.B.G.	25.00
1	Gas furnace, combination 3-S Brodhead-Garrett	19.75
1	*Scroll bender	1.10
1	Bench anvil 2½ x 6 x 9	7.00
1	Floor anvil 100 lb. Vulcan	13.80
1	*Wood anvil base 16 x 16 x 24	5.00
1	Machinist vise, swivel base, 4-in. jaws, Columbian No. 604	15.30
1	Machinist vise, stationary base, 3-in. jaws, Columbian No. 503	9.00
1	*Bending fork sets, No. 1236 Wrot Iron Designers	1.85
1	Iron workers hammer, No. 1025 Wrot Iron Designers	1.00
1	Blacksmith's hammer, 24 oz.	1.10
1	Ball-peen hammer, 8 oz.	.85
1	*Center punch	.20
1	Flat file, 10 in. bastard cut	.35
1	Half-round file, 8 in. bastard cut	.37
1	Round file, 8 in. bastard cut	.42
3 ea.	*File handles, 3–6 in. file, 6–10 in. file	.95
1	Half-round file, 6 in. second cut	.35
1	Round file, 6 in. second cut	.35
1 set	*Cold chisels, ⅜, ¾, 1-in. cutting edge	2.30
1	Tongs, blacksmith's straight tips, 20 in. long	1.22
1	Tongs, blacksmith's curved tips for rounds, 20 in. long	1.39
1	Anvil hardie, Stanley, 1⅛ bit	.78
1	Cold cut hammer, 1¼ in. with handle	1.37
1	Powder blower with 3 extra cups	1.85
Initial necessary supplies — ornamental iron and forge work		
1 q.	Metalite cloth No. 100	.73
1 q.	Metalite cloth No. 120	.70
1 doz.	Soapstone crayons	.20
1 lb.	Rivets, roundhead, 3/16 x ½	.10
1 lb.	Rivets, flathead, 3/16 x ⅜	.10
1 lb.	Rivets, roundhead, ⅛ x 1	.11
3*bu.	Soft coal for forge	.60
160 lin. ft.	Iron, band 1/16 x ½, 16-ft. lengths	2.24
80 lin. ft.	Iron, band ⅛ x ⅝, 16-ft. lengths	1.60
100 lin. ft.	Iron, band ¼ x ¼, 10-ft. lengths	1.20
80 lin. ft.	Iron, band 3/16 x ¾, 16-ft. lengths	1.80
1 sheet	Iron, black sheet, hot rolled 22 gauge, 26 by 96 in.	.85
10 lb.	Steel, tool, ⅜ hexagon carbon vanadium chisel stock	4.00
10 lb.	Steel, tool, ⅝ hexagon carbon vanadium chisel stock	5.00
100 lin. ft.	Iron, round, ¼ diameter	1.20
48 lin. ft.	Angle iron, 1 by 1 by ⅛ in., 16-ft. length	.80
1 lb.	Kasenit, case hardening compound	1.50
1 carton	4 oz. bronze powder, 1 each of nugget gold, emerald green, Florentine red	1.75
SUMMARY — *Bent Iron and Forge:*		
All items, including initial supplies		190.33
Less shop made or improvised items		12.00
Balance, including initial supplies		178.33

References: (1) Brodhead-Garrett Co., Cleveland, Ohio; (2) Weed & Co., Buffalo, N. Y.; (3) Beals-McCarthy & Rogers Co., Buffalo, N. Y.; (4) Albany Hardware Company, Albany, N. Y.

Metal Turning and Spinning

Quantity	*Description*	*Approx. cost*
1 set	Spinning tools containing 1 each of following: No. 1 flat tool, No. 1 point tool, No. 2 flat tool, cut-off tool, beading tool, complete with handles, Brodhead Garrett Co., or equal	$ 13.00
1	Special tool rest for spinning, to fit wood lathe	2.25
1	Ball, bearing tail center	5.00
1	12-thread tap, 1 in. diameter	2.75
1	Screw plate, Champion No. 1 Am. Nat. standard thread	10.13
1	*T* handle tap wrench, ¼-in. capacity	.84
2	Drill and counter sink, 7/16–5/32 carbon steel	.96
1	Combination square, 9 in. with center head, Starrett No. 33	5.30
2	Steel rules 6 in., Starrett No. 324, 32nds, and 64ths	1.80
1	Micrometer caliper, Starrett No. 202 1 in. by 1000ths	9.00
1	Inside caliper, Starrett No. 73, 6-in. solid nut	1.05
1	Outside caliper, Starrett No. 79, 6-in. solid nut	1.05
1	Divider, Starrett No. 83, 6-in solid nut	1.05
1 set	Twist drills, 1/16 to ½ by 64ths, Cleveland No. 54 Carbon steel	7.63
1 set	Drill gauge, Jobbers 1/16 to ½ by 64ths, Starrett No. 187	2.40
2	Hack saw frames, Millers-falls No. 48	3.50
2	Hammers, ball-peen, 12-oz.	1.50
1	Hammer, ball-peen, 16-oz.	.80
1	Oily waste can No. 1, 6-gal. capacity	4.00
2	Scribers, Lufkin No. 87-A	.70
1	Grinding wheel dresser, Huntington No. 0 hooked	.68
1	Wrench, adjustable, single end, 6-in. crescent	.60
1	Wrench, adjustable, single end, 8-in. crescent	.72
1	Wrench, monkey, 10 in., Coes No. 92	1.50
2	Files, 8-in. triangular, second cut	.60
1	File, 8-in. square, second cut	.30
2	Files, 12-in. hand, double cut, bastard	.90
2	Files, 12-in. flat, aluminum Nucut	1.30
2	Files, 10-in. half round, bastard	.86
2	Files, 10-in. mill, second cut	.60
1	Files, 10-in. mill, smooth cut	.33
1 doz.	*File handles, Disston No. 3	1.00
1 gr.	Hack saw blades, 12 in., tungsten alloy med.	8.40

Simple Automotive Maintenance

Quantity	*Description*	*Approx. cost*
1	*Auto motor, used, 4 or 6 cylinder	$ 25.00
1	*Gasoline motor, washer or lawn-mower motor	25.00
1	Model airplane gasoline motor, new	25.00
1	*Stands for each of above types	25.00
1	Electric portable drill, ¼-in. capacity, Stanley No. 114	21.50
1	Grease gun, Alemite, Rush, Z-3-A	7.50
1	Jack, hydraulic bumper lift, No. 124	3.15
1	*Pump, tire No. 255	1.06
1	Rim bolt wrench, four way	.85
1 set	Socket wrench, Williams 6-A	22.98
1 ea.	Spark plug wrench, No. 927, 929, and 931	.75
2	*Tire irons, curved No. 1127	1.30
1	Pressure gauge, tire, heavy duty No. 80 United States Gauge Company	2.17
1	Thickness gauge, Lufkin No. 109	1.50
2	Wire brush, No. 7998, Osborn	1.14
1	Dinging hammer, No. 150-G	2.00
1 doz.	Magneto files, 2½ blade	.62
1	Drain plug wrench, male No. 193 Brodhead-Garrett	.98
1	Drain plug wrench, female No. 194 Brodhead-Garrett	1.05
1	*Dolly, general purpose, No. 1060 Fairmont	3.00
1	Fender bumping hammer, No. 155	2.00
1	Flat file holder, No. 6070 Stanley	1.87
2	Vixon files, 12 in.	3.60
2	Engine cleaning brush, No. 181 Osborn	2.66
1	Hot patch outfit, Shaler	.89
1	Valve grinder, No. 238 Miller Falls	3.17
1	Valve lifter, No. 600	.50
1 set	Ignition wrenches, Williams Midget No. 1129	9.70
2 cans	Valve grinding compound, medium water mix 2 oz.	.26
1 set	Screw drivers, Phillips screws, size 1, 2, 3, 4	1.68
1	Battery plier, 30-deg. angle jaws	.85

Quantity	Description	Approx. cost
1	Battery and starter nut wrench	.38
1	Mechanics creeper, 18 x 39½	2.76
1	*Tube testing tank	4.05
1	Battery filler, No. 107	1.59
1	Auto oiler, No. 228 1 pt	2.00
1 set	Tappet wrenches, Bonny No. 22	3.70
1	Spray gun, Binks No. 22	4.50
1 set	Screw extractors, Ezy-out-set No. 20	3.00
SUMMARY — *Automotive Unit:* All items		220.51
Less salvage items		77.36
Balance		143.15

Foundry

Quantity	Description	Approx. cost
1	*Flask, 6 x 8, 2¼-in. cope and drag type AA	$ 7.53
1	*Flask, 9 x 12, 4-in. cope and drag type AA	8.70
1	*Trowel, square 1¼ in. wide, foundry tool	1.00
1	*Spoon and gate cutter, 1 in. wide, foundry tool	.75
1	*Lifter, ⅛ by 12 in., foundry tool	.70
1	Taper and leaf, 1 in. wide, foundry tool	.75
1	*Rammer, 3½ x 14-in. maple wood	.75
1	Ladle, bottom pour with sleeve, Rowell 6	3.24
1	Ladle, bottom pour with sleeve, Rowell 5	2.43
1	Sprue cutter, ⅝ by 10 in.	.40
1	Small bulb sponge, 4 oz.	1.00
1	Molders bellows, 8 in.	1.82
1	*Riddle, 16 mesh, 18-in. diameter	.80
1	Melting ladle, 3-in. bowl	.30
2 pr.	Safety goggles, Willson No. L31	2.30
1 pr.	Foundry leggins, fire resistant, duck-spring grip	2.30
1 pr.	Asbestos gloves, gauntlet type	3.50
1	*Foundry bench	10.00

References: Combined Supply & Equipment Co., 215 Chandler Street, Buffalo, N. Y.; Brodhead-Garrett, Cleveland, Ohio; American Allsafe Company, Buffalo, N. Y.; Beals, McCarthy & Rogers, Buffalo, N. Y.

Quantity	Description	Approx. cost
125 lb.	Albany molding sand No. 1	$ 3.75
5 lb.	*Iron sil-parting compound	.35
2 lb.	Flux, a.c.	.50
100 lb.	*Lead or old type metal	9.00
50 lb.	*Aluminum	15.00
50 lb.	Gar alloy	10.00
50 lb.	Zamacs, No. 3 alloy metal	15.00
SUMMARY — *Foundry work:* All items, including initial supplies		101.62
Less shop made or improvised items		51.03
Balance		50.59

Sheet Metal

Quantity	Description	Approx. cost
1	Hand brake, 24-in. Dixon	$ 30.00
2	Tin snips, Pexto 2½-in. cut	4.18
1	Tinner's setting hammer, 12 oz.	1.08
1	Tinner's riveting hammer, 12 oz., Stanley	1.08
1	End cutting nippers, Pexto No. 74	1.10
4	*Ring scratch awl	1.20
2	*Prick punch	.70
2	Tinner's mallet, wood	.60
1	Thin nose-straight pliers, 6 in.	.40
1	Lineman's pliers, Krouter 6 in.	2.26
2	Steel rules, 12-in. Starrett No. 303	3.30
1	Steel square, 12-in. body, 8-in. tongue	.76
1	Marking gauge, Stanley No. 90	.92
1	Rivet set, No. 2/0	.80
1	Rivet set, No. 1	.67
1	Rivet set, No. 3	.57
1	Hand groover, 7/32-in. groove	1.05
1 ea.	Solid punch, No. 6, 7, 8, 9, 10	1.05
1	Wing divider, 10-in. length	1.32
1	Compound lever shears, 7 in.	3.35
1	Tinners circumference rule	4.40
1	Hollow punch, Pexto, ⅜-in. dia.	.96
1	Hollow punch, Pexto, 1-in. dia.	1.92
1	Handy seamer, Pexto, No. 793	1.92
1	Breakhorn stake	26.25
1	Creasing stake	15.00
1	Needle case stake	15.00
1	Square stake, Pexto, No. 936	7.50
1	Revolving stake holder	7.50
1	*Plumber's scraper	.26
1 pr.	Soldering coppers, 1 lb.	.52
1 pr.	Soldering coppers, 2 lb.	.90
1 doz.	*Soldering copper handles	.60
Plumbing		
1	*Water closet, flush tank (salvage)	5.00
1	*Compressor faucet, plain ½ in.	1.50
1	*Fuller faucet, plain ½ in.	2.00
1 set	Pipe dies, ratchet type, ⅛, ¼, ⅜, ½, ¾, and 1-in. dies, with stock, Reed No. 71-1	17.00
1	Vise pipe No. 2/0	3.12
1	Wrench, pipe, 8-in. straight pattern Pexto No. 1	.63
1	Wrench, pipe, 14-in. straight pattern Pexto No. 11	1.04
1	Wrench, Monkey, 15-in. Pexto	2.39
1	Bibb reseater, Skinner self-aligning	4.50
2 sets	Brass hose couplings, ⅝ in.	.34
1 doz.	Brass hose clamps, ⅝ in.	.58
SUMMARY — *Plumbing unit:* All items		38.10

Electricity Unit — Equipment

Quantity	Description	Approx. cost
1	*Motor, ¼ h.p. propulsion-induction 110 volts	$ 15.00
1	*Auto generator d.c., 6–14 volts	8.00
1	*Auto storage battery, 6 volts	7.00
1	Battery charger, 3-cell tungar type, 5 amp. delivery	15.00
3	Bell transformers, 10-volt type L	2.25
1	*Heavy duty transformers, 4 to 24 volts, signal type 100 V.A.	5.75
1	Radio antenna, insulators, lead in and lightning arrester	4.00
1	Lodestone	.25
4	Magnetic compass	1.00
2	Bar magnets	1.10
2	*Horseshoe magnets	1.00
1	*Electric train set, No. 2/0 gauge	15.00
4	Bells	1.00
4	Buzzers	1.00
4.	Heater units, screw type	1.50
2	*Crystal radio sets	1.00
2	Sets earphones	7.50
1	*Telephone set, No. 44 Duplex, Brodhead-Garrett	6.50
1	Electric eye set, Gilbert	9.00
1	*A.c. radio	15.00
1	*Auto headlight	3.00
1	*Auto voltage regulator	2.10
1	*Auto fuse block	1.00
1	*Auto generator cutout	1.50
3	Key sockets, No. 10 with pendant caps, No. A.T.	.45
3	Keyless sockets, No. 13 with pendant caps, No. A.T.	.30
3	Pull chain sockets, No. 15 with No. AA ⅛-in. cap	.45
2	Weatherproof sockets, composition	.25
1	Insulated socket-porcelain pull chain, No. 75, No. PA cap ⅛ in.	.70
1	Milliammeter type N x 35 O–100 M.A. d.c.	10.00
1	Voltmeter d.c. 0–20, V.A. 35 flush mounting 3⅜-in. diameter	9.00
1	Voltmeter a.c. 0–150, V.A. 35 flush mounting 3⅜-in. diameter	12.75
1	Ammeter a.c. 0–30, V.A. 35 flush mounting 3⅜-in. diameter	12.75
1	Ammeter d.c. 0–25, V.A. 35 flush mounting 3⅜-in. diameter	9.00
1	*Standard electric iron	6.00
1	*Standard reflector type heater	3.50
1	*Electric fan, 8 in.	4.00
1	Electric door opener, magnetic type	1.50
1 set	Series Christmas tree lights	2.00
1 set	Parallel Christmas tree lights	5.00
3	*Plating baths (crocks or square fish bowls)	3.00
6	Push buttons	.60
1	*Auto horn, magnetic	3.00
1	*Auto horn, motor driven	7.00
2	*Toy motors, Erector set type	2.00
1	*Electric clock	6.00
1	*High voltage induction coil (Ford T-model coil)	1.50
1	Fluorescent lamp, desk type	10.00
12	Miniature lamp bases, Bryant No. 366	.60

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Industrial Arts and Vocational Education
John J. Metz, Editor

HELPING A GOOD THING ALONG

Are we shop teachers helping along the many good movements that have been inaugurated or are we intent only in furthering the activity in our own shop subject? It is true, without a doubt, that a shop teacher should be most enthusiastic about and interested in his own subject. That interest and enthusiasm, however, should not preclude a recognition of the good that lies in other movements that are beyond one's own activity.

A number of weeks throughout the year have been set aside to observe special activities. To mention just a few of these, there are the Fire Prevention Week, Printing Education Week, Boy Scout Week, Boys' and Girls' Week, Conservation Week, and many others. All of these movements were started by enthusiastic personalities who were obsessed with the idea of accomplishing a certain objective. These movements embody a great deal of good in the way of setting up certain personality habits, ideals, attitudes, and the like. They should be assisted in every way possible and many of them fit in very well with the objectives if not directly with the courses taught in the average school shop. It takes extra planning, but the over-all results will be found amply worth while in the way of better student attitudes, and the teacher will have the personal satisfaction of having broadened his sphere of influence.

Some of this work can be carried on throughout the year. For instance, you in your school shop can do your share of continuing the valuable thrift habit some students have acquired through the impetus of the wartime bond and stamp savings program. This too, although no special week has been set aside for it, is worthy of your help.

Of course, the patriotic motive of winning the war can be no longer set before the young as an incentive for buying bonds and stamps, but the fact that money is needed to hospitalize and rehabilitate the hundreds of thousands of American boys who were wounded during the war can be woven into an appeal that will be just as powerful, or even more potent than the victory motive.

The question may be asked, "Is that part of the shop teacher's job?" The instructor who poses this question can easily find the answer to it by asking himself another question. "Is it any one teacher's job to work for the general betterment of the student, or is that a part of every teacher's job who comes in contact with the student?" He will undoubtedly see his obligation even though, on the face of it, he may think that someone else could do the job better. Then, too, it is not necessary that the shop teacher should play the role of a banker, but he should use his influence in this case as well as in others that come up during the year to get his students to acquire proper attitudes and personal ideals.

In this general way, the shop teacher can do his share in helping many good movements along, and in that way widen his influence as a builder and molder of youth for the betterment of the individual and of the world at large.

The challenge is there. It remains for us to do something about it.

A REAL NUISANCE

Manufacturers are frequently flooded with letters requesting information which industrial-arts students evidently need to write up assignments given to them by their teachers of English or shopwork.

These requests are usually couched in terms, such as the following: "Please send me all the information you have on the history and the development of the lathe." Other letters differ from the one just cited merely by naming a product or another hand or machine tool. Not infrequently, one mail contains from one to a dozen of these letters.

Naturally, the manufacturer would like to help out these youngsters, but he, too, has to battle against man-power shortages. To answer just one of these letters may require hours of research if the answer is to be worth anything, and it is a task which cannot be turned over to a secretary, even though a secretary might be available.

It would be far better for teachers to encourage students to do this research themselves in the school library or at a local library. In that way the students would acquire experience in the proper use of the library which might stand them in good stead in their later lives.

On the next occasion, when assigning such a subject as a theme on the history and development of a given tool, will you kindly advise your young hopefuls not to have the manufacturer of the given tool write their compositions for them. The manufacturers, no doubt, would like to oblige but they really do not have the time.

CLEVELAND'S BOYSTOWN CENTERS

Cleveland has found her four Boystown centers to be excellent for curbing delinquency. These centers are in existence for quite a number of years, but a revision in the program made two years ago has helped them carry out their true function much more effectively.

The membership ages range from 8 to 18 years. Once a year the members elect a mayor and cabinet for their respective center. Each center also has a council, a safety director, judges, prosecutor, chief of police, policemen, and clerks. This makes the boys feel that the success of their Boystown rests upon their own efforts.

Each Boystown has a small gymnasium where such games as basketball, boxing, volleyball, and tennis can be indulged in, in a limited way. City recreational centers are used for regular basketball games, swimming, and other indoor sports.

The Boystowns also are equipped with workbenches and tools for shopwork, and a number of Cleveland's industrial-arts teachers supervise these shops. As a matter of fact, Frank C. Moore, director of industrial arts, and Carl H. Hamburger, and Leslie Frye, supervisors of industrial arts at Cleveland, assisted a great deal in the establishment of the four centers.

Well-stocked libraries also are available for youthful readers to enjoy. The Kiwanis Club was quick to see the possibilities of these centers and contributed furniture, books, and games. The Kiwanians also arrange parties, picnics, and entertainment for the members of the four Boystowns.

Cleveland's success ought to prompt other cities to inaugurate similar experiments. Boys who are kept busy with worth-while activities during out-of-school hours will cause little trouble, and the reduction in juvenile delinquency will amply justify the expenditure of money for the maintenance of these Boystown centers.

(Continued from page 206)

Quantity	Description	Approx. cost
3	Battery knife switches, single pole throw	.45
1	Battery hydrometer	1.50

References: *Supplies,* Chicago Scientific Co., Chicago, Ill.; Brodhead-Garrett Co., Cleveland, Ohio. *Equipment,* Bryant Electric Co., Bridgeport, Conn.; Westinghouse Elect. & Mfg. Co., Pittsburgh, Pa.; General Electric Co., Schenectady, N. Y. *Radio,* Allied Radio, 833 W. Jackson Blvd., Chicago, Ill. Also any electric supply house.

Initial Necessary Supplies

Quantity	Description	Approx. cost
1	Roll friction tape	$ .25
1	Roll splicing compound	.35
6	Dry cells, Eveready or equal	2.40
2	1 lb. coils annunciator wire	.90
5 lb.	Wire, magnet No. 22 plain enamel	.68
1 doz.	Fuse plugs	.37
1 doz.	Miniature flashlight bulbs, 3.5 volts	.65
100 ft.	Parallel lamp cord No. 18	1.67
1 doz.	Fahnestock clips No. 3	.23
SUMMARY — *Electrical Unit:* All items, including initial supplies		248.60
Less shop made or salvage items		96.85
Balance including 1 yr. initial supplies		151.85

NOTE: Since there are very few special electrical tools these have been included in wood or metal units (screw drivers, pliers, wire gauge, etc.).

Ceramics Unit — Equipment

Quantity	Description	Approx. cost
1	*Potter's kick wheel, Drakenfeld or equal	$ 87.50
1	Electric kiln, Amoco No. 4 or equal	250.00
1	*Clay storage cupboard, Amoco or equal	20.00
1	Metal sieve, 120 mesh, 8-in. diam. Drakenfeld or equal	2.60
1	Metal sieve, 80 mesh, 8-in. diam. Drakenfeld or equal	2.00
1	Mortar and pestle, 16-oz. Wedgewood, Amoco, or equal	3.00
3	Crocks, 2 gal. glazed inside and out; stoneware with cover	1.50
12	*Jars, glass, ½ pint with pressure type cover	1.20
6	*Jars, glass, 1 quart with screw type cover	.60
2	*Pans, No. 14 Drain Pan Brodhead-Garrett or equal	4.40
3	*Pans, 3 in. deep, 10–12 in. diameter, enameled	1.50
1	Bench whirler, Drakenfeld, 6 in. or equal	2.75
1	*Wedging board, Amoco or equal	12.00
6	Modeling bats to fit 6-in. bench whirler	5.10
1	*General storage cupboard approx. 18 in. deep, 36 in. wide, 38 in. high Lyon-Durand Steel or equal	70.00
Tools		
12	*Camel hair brushes, Amoco No. 58-3, or equal	4.80
6	*Camel hair brushes, Amoco No. 7842, ¼ in., or equal	1.80
	*Starred items can be made in shop or improvisions may be used. See list following.	
1	Modeling tool Amoco No. 13 or equal double end brass wire	.45
1	Modeling tool Amoco No. 12 or equal double end brass wire	.45
2	*Modeling tool Amoco No. 4 or equal boxwood	.30
2	*Modeling tool Amoco No. 5 or equal boxwood	.30
1	*Modeling tool Amoco No. 9 or equal boxwood	.10
1	Finishing rubber Amoco No. 1, 2⅛ x 3¼	.55
2	*Elephant ear sponges, Amoco or equal	1.20
1 pr.	*Turning tools right and left, Amoco or equal	1.60
1 set	Sgraffito tools, 6 blades and holder, Amoco or equal	1.00
6	Tile setters, Amoco or equal, 7½ in. sq. x 1¼ in. high	6.00
4	Shelf supports, 1 x 1 x 2 in. silicon carbide	.60
4	Shelf supports, 1 x 1 x 4 in. silicon carbide	1.00
1	Kiln shelf, ⅜ x 9 x 11¾ in. silicon carbide	1.50
2	*Knives, mold makers, Amoco or equal	.60
1	*Spatula, 4-in. blade	.60

Initial Necessary Supplies

Quantity	Description	Approx. cost
5 lb.	Kiln wash, Amoco or equal	.60
1 doz. ea.	Pycometric cones, Nos. 04, 05, 06, 012, Amoco or equal	1.70
50 lb.	*Clay, buff, red, terra cotta, in tubs, Amoco	10.50
50 lb.	*Plaster of Paris, Amoco or equal	3.50
10 lb.	Grog, Amoco or equal	1.20
1 gr.	Saddle stilts, No. 1, Amoco or equal	.50
1 gr.	Saddle stilts, No. 3, Amoco or equal	1.25
1 gr.	Double pointed stilts, assortment	1.00
1 8-oz. bottle	*Separator, Amoco or equal	1.70
1 set	Majolica glazed samples, Amoco	2.25
1 set	Grylby glaze samples, Amoco	.60
1 set	Single fire glazes, Amoco	1.40
1 lb of ea.	of the following: Majolica glazes, Cone 05 White, Dark Blue, Chocolate Brown, Dark Salmon, Chinese Yellow	6.00
1 lb. of ea.	of the following Amoco low fire glaze, Cone .012, black, gray, turquoise blue, dark green, scarlet red	7.00
SUMMARY — *Ceramic Unit:* All items		275.15
Less shop made or improvised items		96.10
Balance, including 1 yr. supplies		179.05

Improvisions for Ceramic Unit — Suggested

1. Potter's kick wheel may be made in shop by purchase of Amoco wheel unit No. 3 at $39 which may be set in tables, etc.
2. Old refrigerators or iceboxes make excellent storage cupboards for clay and unfinished pottery work.
3. Ordinary ½-pint fruit jars can be used for storage of glaze mixtures.
4. The glass jars in which school paste is furnished make excellent 1-quart glaze containers.
5. In place of special drain pans, ordinary enameled, tin or aluminum dishpans may be used.
6. Wedging boards may be made in the woodshop using ordinary plaster of Paris.
7. General storage cupboards need not be any special size or shape for ceramics work. Sturdiness and ventilation are about the only necessary qualities.
8. Cheaper brushes may be used, but ordinary glue-set water paint brushes are not as satisfactory or durable as those specified.
9. Wood modeling tools can be made from red cedar. If dipped in hot paraffin, these are as durable as boxwood.
10. Any soft fine grained sponge will be found suitable in place of elephant ear sponges.
11. Turning tools can be made in the metal shop using file handles for grips. Tool steel desirable but not essential.
12. In place of the knives specified, any sturdy paring knives or nickel-silver table knives will be found suitable.
13. Any kitchen spatula can be used.
14. In many localities in New York State there are deposits of gray, blue, yellow, and red clay. (See N. Y. State Museum Bulletin, Vol. 3, No. 12, 1895 Ries.) Experimentation with samples of this clay will readily determine its suitability for pottery work.
15. Potter's plaster of Paris is sold commercially in 100-lb. bags for about 2¼ cents per lb. See local builders supply house.
16. Liquid soap may be used as a separator, after it is boiled down to thicken it.

Textile Unit — Equipment

Quantity	Description	Approx. cost
1 set	*A.B.C. looms, J. L. Hammett, Newark, N. J.	$ .90
2	*Tool looms	1.40
2	Weave-it-looms, 4 in.	2.00
2	Colonial mat frames 10 x 10	.60
1	*Circular knitting frame, 11-in. diameter	1.00
2	*Straight knitting frame, 15 in. long	1.20
1	*Broad-weave rug frame	6.00
2	*Box looms, Industrial Arts Co-op Co.	8.00
1	Loom, 4 harness, 8-in. space, Structo No. 240	12.00
1	Loom, 4 harness, 20 in., Bernat No. 220	22.00
1	*Warping frame, 10-yd. capacity	6.00
1	*Lola loom, 28½ x 24½	6.50
3	Throw shuttles, No. 2	4.50
1 doz.	Paper quills	.30
2	*Loom benches, 26 in. high, 10 x 30 in.	12.50
1	*Warping reel	15.00
1	Bobbin winder	6.20
1	*Ideal rug loom, 36 in.	35.00
1	Weave rite loom, adjustable	.50
1	Spinning device, Industrial Arts Co-op	2.50
1 pr.	Cards, wool carding	2.00
1	Electric heater, Challenge 2 burner	3.50

Quantity	Description	Approx. cost
1	Electric hand iron, Heatmaster super duty or equal	6.00
1	*Ironing board, stand and cover, 11-K 02411, Sears	3.00
1	*Hand cleaner, electric suction, Franklyn or equal	9.00
1	*Clothes wringer, 11-K 05901, Sears	6.00
2	*Bailed tubs, 17-qt. capacity, round	2.60
1	Portable washing machine, Powerwasher, 20-K 07325, Sears	16.00
SUMMARY — *Textile Unit:* All items		188.70
Less shop made items		80.00
Balance		108.70

References: Industrial Arts Co-op Service, 519 West 121st Street, New York, N. Y.; J. L. Hammett Co., Newark, N. J.; Brodhead-Garrett Co., Cleveland, Ohio; Sears-Roebuck, principal cities.

Printing, Bookbinding, Papermaking — Equipment

Quantity	Description	Approx. cost
1	Lever press, Pilot, 6½ x 10 complete with cabinet fitted with imposing surface, A.T.F. No. 9188-X	
1	American school type cabinet with California job cases, American Type Founders 9190	
1	Font of wood reglets and furniture, No. 3760-K	
1	Quarter size rule case, No. 3045	
1	Brayer, 5 in.	
4	Composing sticks, 2 x 6 in. Rouse	
6	Galleys, pressed steel, 6 x 10 in.	
1 doz.	Gauge pins, No. 2 steel, Megill	
1 doz.	Quoins, No. 0 challenge	
1	Quoin key for No. 0 quoins, Style C	
1	Proof planer, 3½ x 8 in.	
1	Proof planer, 1¾ x 3 in.	
NOTE: Above items included in cost of A.T.F. No. 3-G Printing Unit.		
1	Paper shears, 10-in. blade, bent trimmers	$ 2.75
2	Linoleum block carving set, Speed Ball No. 1	.80
1	Paper cutter, No. 4, 12½ in.	5.40
3	Bone folders, 7 in.	1.05
1	Eyelet punch, Triumph No. 190	1.90
1	Backing hammer, 10 oz.	.14
1	Stapler, hand, D-40C Nevaclog extension	4.00
1	*Silk screen printing outfit, Industrial Arts Co-op Service	20.00
1	Lettergraph post card printer	8.50
1	Gluepot, electric, Stay-warm, 1 pt.	13.00
1	*Meat grinder (for papermaking), 11-K 5526, Sears	4.00
1	*Clothes wringer (for papermaking), 11-K 05901, Sears	6.00
1	*Hectograph duplicator No. 22 Letter size	1.75
1	*Bookbinding Unit, Pratt	47.50
1	*Mold & deckle (papermaking), Industrial-Arts Co-op Service	4.50
1	*Linoleum block press, Speedball	10.00
SUMMARY — *Printing, bookbinding, papermaking:* All items approximately		400.00

Reference: No. 3-G Printing Unit, American Type Founders, Dept. of Education, 200 Elmora Ave., Elizabeth, N. J.

Woodwork Unit — General Tools

Quantity	Description	Approx. cost
4	Jack planes, No. 5C, 14 in.	$ 14.56
2	Block planes, No. 118	4.80
3	Nail hammers, No. 15, 13 oz.	4.14
1	Nail hammer, No. 15, 16 oz.	1.38
4	Try squares, 6 in.	2.28
1	Wing divider, 10 in.	1.32
2	Marking gauges, No. 265, no graduations	2.00
1	T Bevel, 10 in.	1.15
2	Handsaws, crosscut, 26 in., 10 point	6.24
1	Handsaws, rip-cut, 26 in., 6 point	3.12
2	Backsaws, No. 4, 12 in.	4.24
2	Coping saws, No. 10	1.60
1	Brace No. 915, 10 in.	.95
1 set	Auger bits, 13 bits ¼ to 1 inch, Irwin	7.00
1	Auger bit gauge, No. 49	.88
1	Expansion bit, Irwin No. 2	1.28
2	Brace countersinks, rosehead 5/16	.58
1	Draw knife, 8 in.	2.00
1	Spokeshave, No. 55	.57
1	Spokeshave, No. 51	.44
1 set	Wood chisels, R-110	9.85
2	*Mallets, wood	1.00
1	Woodscraper, No. 34, 2½ in.	.50
1	Rasp, half round, 12 in.	1.06
2	Files, half round, cabinet, 12 in.	1.74
4	*Nail sets, assorted	.48
1 ea.	Screw drivers, No. 20, 4 in., 6 in., 8 in.	1.40
1 ea.	Screw driver bit, 5/16, 3/8, ½ in.	.50
3	I 4 bar clamps, 4 ft., No. 640	9.30
2	*C* clamps, 6 in.	1.92
1	Level, 26 in.	1.50
4	Counter dusters, 9 in.	2.68
2	Carborundum stones, double face, No. 110	2.50
2	Auger bit files	.50
2	Oilers, No. 163	.80
1	Putty knife	.35
1	Dowel jig, No. 59, Stanley	2.63
1	Hand drill, ¼-in. capacity, No. 617, Stanley	3.34
1 set	Carving tools, Millers Falls, No. 108	4.00
2 ea.	Hand screws, sizes 0, 1, 2	9.00
2	"C" clamps, 4 in.	1.28
1 set	*Drill points, Yankee, 8 points	.70
4	Bench rules, 12-in. steel, Lufkin No. 60	1.68
1	Bench rule, 24-in. Stanley wood, No. 34-V	.50
1	Steel square, 24-in. Stanley, No. 3B rafter table	1.60
1	Fore plane, Stanley No. 6, 18 in.	4.90
1	Router plane, Millers Falls, No. 67	3.75
1	Keyhole saw Disston, No. 95	.64
1	Compass saw Disston, 12 in.	.78
3	Sloyd knives, 3 1/3-in. blade	1.14
1	Set, wood turning tools, Shamrock Set A	9.60
1 ea.	Shrink rule, boxwood, 3/16 or 5/16 shrinkage	3.06
1	Calipers, firm joint, 6 in.	.80
1	Rule, push pull, flexible, Stanley No. 63	1.14
1	Miter box and saw, Stanley No. 2244	22.85
1 set	Carving tool slip stones, India	1.68
1	Carborundum slip stone, medium grit, No. 178	.57
1	Glass cutter, turett head No. 1	.35
1	*Burnisher, Disston No. 11	.60
1	Saw set, Stanley No. 42	1.80
1	*Saw clamp, Disston No. 2	2.79
2	Saw files, 3 square, 8 in. second cut	.78
SUMMARY — *Woodwork Unit:* All items		176.68

SAMPLE SPECIFICATIONS

The following sample specifications are given to indicate the amount of fine detail necessary for competitive bid purchasing. If buying is done on the open market this much detail is often unnecessary.

Ceramic Equipment

Kiln

1 *Electric potter's kiln:* Amoco No. 4 or equal. Firing chamber approximately 10 in. wide x 12 in. deep x 12 in. high. Heating elements embedded in replaceable sections, four sides and bottom. Elements wired for 220 volts a.c. Current 15 to 30 amperes. Single phase. Maximum heat, 1950 deg. F. in 5 to 6 hours. Kiln unit to be of sheet-metal exterior construction with front and rear castings. Must be floor model with slide or pivot type door and enclosed, lockable switch controls with pilot light. Drying and storage compartment with removable shelves in base. Over-all width, 25 to 30 in., depth, 25 to 30 in., height, 45 to 60 in. Equipment: 1 shelf, 4 props. Approximate cost, $250.

Potter's Wheel

1 *Potter's foot power wheel:* Wood frame, approx. 36 in. high, 22 in. wide, 20 in. deep. Strong and rigidly constructed of 1-in. stock fastened with screws. Balance wheel, cast iron from 75 to 80 lb. Wheelhead, 10–12 in. diameter, rustproof, turning on true level. Treadle propulsion with heavy duty ball and sleeve bearings. Drakenfeld, Amoco, or Pereny type recommended.

References: B. F. Drakenfeld & Co., Inc., 45 Park Place, New York City; Pereny Pottery Co., 842 N. Pearl, Columbus, Ohio; American Art Clay Co. (Amoco), Indianapolis, Ind.

Filing Cabinet

1 *Filing cabinet,* complete, finished in olive green, including the following sections, all drawers and sections to have individual locks.

1, Top section, 2 in. high, 10 in. deep, 34 in. long.

Bookcase sections. Glass door front, 13 7/16 in. high, 19 in. deep outside. Inside capacity, 34 in. for books up to 11 x 19 in.

Card section, 4 x 6 in., 5 drawers, 6 in. high, 19 in. deep, outside.

Blueprint section, 12 in. high, 27 3/16 in. deep outside, 4 drawers. Each drawer to be made with hood at back and compression at front

to prevent papers from curling. Drawers, 2¼ in. high, 34 in. wide, 25½ in. deep inside.

Letter file section, 12 in. high, 27 3/16 in. deep outside. Two drawers, inside dimensions, 10½ in. high, 12 in. wide, 25½ in. deep.

Sanitary base, 9 in. high for sections, 27 3/16 in. deep.

4 sets, No. 25 celluloid, 64 alphabetical guides.

4 sets, No. 25 celluloid, 53 alphabetical guides.

40, heavy, 6 x 4 in. Buff 1/3 cut guides.

40, heavy, 5 x 3 in. Buff 1/3 cut guides.

4 sets, No. 25-P404 pressboard regular guides.

40, P404 pressboard guides 1/3 cut.

Printing, Bookbinding, Papermaking

1 *Pilot lever press,* chase size, 6½ x 10 in., with standard equipment consisting of single disk, depressible grippers, 1 semisteel chase, wrench and 2-cast rollers.

1 *American school type cabinet,* wood construction, with two-sided working-bank top and single tier body containing 1 blank case, 1 Morgan lead and slug case, 2 Wells two-font cases and 12 California Job cases fitted with Masonite bottom and having cabinet front with combination pull and label holders.

1 *Press and materials cabinet,* American No. 9188-X. Wood construction with 12 sloping shelves for 8¾ x 13-in. galley, 1 drawer for storing 4 pilot lever press rollers, 1 drying rack drawer, 1 chase rack unit for 5 pilot lever press chases, and 2 open bins for paper stock; complete with movable cabinet bin fitted with 12 x 18 x 1 in. marble imposing surface. Floor space, 49 x 24½ in. Height of cabinet, 25 in.

Ordering Procedures

Correspondence, in order to receive immediate attention, orders should be addressed to the firm, and not to individuals.

Prices are usually subject to change without notice.

Specifications for goods not standard should be explicit and complete, and when possible, accompanied by a sketch or sample.

Claims for errors, shortages or defective goods, must be made usually within ten days. Contact firm for instructions before returning goods.

Responsibility for goods lost or damaged in transit is usually borne by the transportation company and claims of this kind should be referred to them.

Shipping directions, when not specified, are left to the discretion of the manufacturers who will select the best and cheapest route.

Contracts and shipping agreements are always made subject to strikes and accidents.

Errors in ordering may be avoided by using up-to-date catalogs and by adding catalog numbers to items ordered.

Grouping of like items, in alphabetical order, facilitates filling of the order and saves time.

Blanket orders can seldom be filled by one firm. Try to place orders for specialities in the hands of firms who make them.

Discounts are sometimes given to educational institutions over and above the usual credit discounts.

C.O.D. orders by new customers or by individuals (teacher, engineer, etc.) must usually be accompanied by a cash deposit.

Ordering or requisition forms are sometimes furnished by manufacturers but it is helpful for the school system to establish a triplicate, three-color order blank printed with school addresses or receiving depot. A typical layout is shown in Figure 1.

Bidding forms are furnished by the school system to dealers who are invited to bid on items. A typical bidding form is shown in Figure 2.

Prices in catalogs are net and do not include shipping charges unless so specified.

Time for placing of orders and delivery is important. Do not place orders just before the opening of school and expect results.

TYPICAL REQUISITIONING FORM

(Padded in 3 colors)
Request for Materials or Equipment
Board of Education

No. .....
Deliver to.....Date .....
To be used for.....Agency .....
When wanted..... .....

Quantity	*Unit*	*Description*	*Item No.*	*Unit Price*	*Total*

Fund chargeable: Maker of request.....
..... Approved: .....
Supervisor, Principal, etc.
Remarks: .....

Fig. 1. Typical requisition form

TYPICAL BIDDING FORM

Layout should include: Date, time, and place where bids are to be opened. Place for name and address of bidder. Title of specifications, form numbers, date of form, and general conditions and instructions to bidders.

Typical item bid form: Item No. 2.

Grinders, two (2) required, pedestal type.

Grinders shall be Clark, Standard, or equal, one horsepower, 10-in. wheels to operate on 220 volts, 3 phase, 60 cycle a.c., guards adjustable to wear of the wheels. Diameter of shaft to be not less than ⅞ in. Equipped to include one medium fine and one medium coarse Norton Grinding Wheels, 10 x 1 x ⅞ in. and all necessary safety eye shields, rests, and wrenches.

Bid on Article Specified $.....
Substitute Bid.....
For Article.....
Specified ..... $.....
Delivery Date.....

Fig. 2. Typical bidding form

Sources for General Shop Equipment and Supplies

All units: Brodhead-Garrett Co., Cleveland, Ohio; Sears Roebuck & Co., Chicago, Ill., or in larger cities.

Woodwork: Delta Mfg. Co., Milwaukee, Wis.; Walker-Turner Co., Plainfield, N. J.; Sears Roebuck & Co., Chicago, Ill., or in larger cities.

Metalwork: Metal Crafts Supply Co., Providence, R. I.; Niagara Machine & Tool Co., Buffalo, N. Y.; Peck, Stow & Wilcox Co., Southington, Conn.; Wm. Dixon, Inc., 32 E. Kinney St., Newark, N. J.; Wrot Iron Designers, 541 West 35th St., New York City.

Ceramics: American Art Clay Co., Indianapolis, Ind.; B. F. Drakenfeld Co., 47 Park Pl., New York City; Pereny Pottery Co., 842 N. Pearl St., Columbus, Ohio.

Textiles: J. L. Hammett Co., 380 Jelliff Ave., Newark, N. J.; Industrial Arts Co-op Service, 519 W. 121 St., New York City; American Reed Craft Corp., 130 Beckman St., New York City.

Printing: American Type Founders, Ed. Dept., 200 Elmora Ave., Elizabeth, N. J.; Brodhead-Garrett Co., Cleveland, Ohio.

Electricity: Bryant Electric Co., 101 Park Ave., New York City; Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.; General Electric Co., Schenectady, N. Y.; Allied Radio Co., 833 W. Jackson Blvd., Chicago, Ill.; Central Scientific Co., Chicago, Ill.

Salvaged, Improvised, or Shop Made Equipment

Foundry bench. School sand table may be used, shop made, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine.

Pottery kiln. Outdoor kilns are described in "Iowa Clays and Their Uses," University of Iowa.

Clay storage cupboard. Old iceboxes and refrigerators are ideal for this purpose.

Printing press tables. Can be made in woodshop.

Potter's wheels. Can be made in general shop.

Mallets. For art metal and woodwork can be turned on a wood lathe.

Alcohol torch. Can be made from hand oilers.

Crimping blocks.

Plate molds. Can be made in woodshop.

Chasing tools.

Background tools.

Leather tooling devices. Can be made in metal shop.

Etching dishes. Any square glass dishes are suitable.

Anvil base. Any block cut from tree will do. If set in sand, noise is subdued.

Bending forks. Can be made in metal shop.

Center punch. A favorite project for machine lathe work.

File handles. Can be made from broom handles or turned on wood lathe.

Cold chisels. Can be made in forge unit.

Soft coal. For forge, any soft coal may be used.

Auto motor. Local garage will usually donate one for educational purposes.

Gasoline engine. In rural districts, many of these are used on farms for washers, mowers, etc. Should be easy to purchase for nominal sum.

Motor stands. Can be made in metal shop from old bedspring angle iron.

Tire irons. Can be forged from broken auto spring.

Auto dolly. Can be made in woodshop.

Tube testing tanks. Can be made in sheet-metal unit.

Foundry flasks. Can be made in woodshop, using lumber. Use metal corner angles for reinforcing.

Foundry riddle. Commercial riddles are usually too large and un-

wieldly for boys. Can be made from ordinary copper screening on small frame.

Foundry metal. Old storage batteries, aluminum, auto pistons, plumbing pipe, old type-metal, are sources for foundry metals.

Parting compound. Talcum powder may be used.

Foundry rammer. Can be turned on wood lathe.

Foundry slicks. Simple forms may be made in metal units.

Scratch awls.

Prick punches. Can be made on machine lathe.

Plumbers scrapers. Can be made in metal shop.

Soldering copper handles. Can be turned on wood lathe.

Water closet tank. Local plumber may donate one for educational purposes.

Compressor faucet.

Fuller faucet. See local plumber for donation.

¼ H.P. electric motor. A common type of motor found on washing machines.

Auto generator. See local garage for donation.

Auto storage battery. Weak batteries discarded from automobiles usually have two good cells.

Transformer. Toy transformer such as used for model railroads is suitable.

Horseshoe magnets. Old magneto magnets will serve.

Crystal radio sets. Can be made in electrical unit.

Electric train set. An older student who has outgrown a set might donate or sell set to school.

Telephone set. Toy sets are available, or set can be made in shop.

A.C. Radio. Chassis may be purchased at nominal cost. Cabinet can be made in woodshop.

Auto headlight.

Auto horns.

Voltage regulator.

Fuse block.

Generator cutout. See local garage for salvage.

Electric iron.

Electric clock.

Reflector heater.

Electric fan. Many old models available as donations.

Plating baths. Earthenware crocks or square fish bowls can be used.

Ceramic equipment. See separate list.

Frame looms. Can be made in shop but low cost hardly justifies work.

Heddle looms. Same applies to this type of loom.

Ironing board. Can be made in woodshop.

Hand cleaner, electric. Old ones may be reconditioned in shop.

Clothes wringer. Available as donation.

Dye vats. Any pails or galvanized tubs can be used.

Silk screen press. Can be made in woodwork unit.

Linoleum block press. Can be made in wood or metal unit.

Hectograph duplicator. Can be made in sheet-metal unit.

Book binding equipment. Can be made in wood and metal units.

Mold and deckle. Can be made in woodshop.

Drill points. For woodwork can be made from nails and case-hardened.

Nail sets. Can be made on machine lathe or forged from square stock.

Miter box. Wood miter box will serve for a long time if made accurately.

Burnisher. Can be made by grinding off teeth and polishing a three square file.

Saw clamp. Can be made in wood unit.

SUMMARY — ALL COSTS

(Round figures)

Unit	*All items*	*Less salvage*	*Balance*
Large equipment	$3,000	$150	$2,850
Metal units			
Art metal	104	31	73
Ornamental iron	190	12	178
Metal turning	93	1	92
Automotive	220	77	143
Foundry	101	51	50
Sheet metal	139	3	136
Plumbing	38	8	30
Electricity	248	96	152
Ceramics	161	96	65
Textiles	188	80	108
Printing units	400	73	327
Woodwork units	176	2	174
Total, all units	$5,058	$680	$4,378

Suggested Combinations for limited budgets
Maximum Costs — Total

1st yr. Metalwork, all units, plus woodwork plus 1/3 large equipment	$2,061
2nd yr. Electricity, plus ceramics, plus 1/3 large equipment	1,409
3rd yr. Textiles, plus printing, plus 1/3 large equipment	1,588

Techniques Used in Teaching Machine-Shop Operations to the Blind

*Robert S. Hunter**

(*Continued from page 161 of the April, 1946, issue*)

Shop Performance Testing

Need for Objective Testing. The previous section has attempted to describe some of the techniques employed in teaching machine-shop work to the visually handicapped, but it omits certain pertinent facts. These students were motivated with the thought and the hope that they could use such training as an entering wedge into industry. In short, they hoped to obtain gainful employment. As prospective aspirants for jobs in industry and specifically the machine-shop trade, they will be competing with sighted individuals. This is quite a hurdle to surmount. In the past, employers have been loathe to hire the visually handicapped, and those interested in the blind have bemoaned this discrimination. It is true, that a number of the blind have obtained work in the sheltered industries, for example, basket making, broommaking, and the like. But relatively few have found a niche for themselves in the metal trades. It becomes apparent that the afore-mentioned techniques need to be supplemented with objective facts. Such questions as: What degree of accuracy may be expected from a blind lathe operator? and How long does it take him? deserve attention. No matter how sympathetic the approach to the problems of the blind may be it would be a mistake to ignore the questions.

Data gathered about the blind would be somewhat meaningless, since it would tell merely, how much better one blind student was than another. Such information would be interesting enough, but the data takes on added significance if it is also known how a blind student compares with a sighted individual when performing the same task.

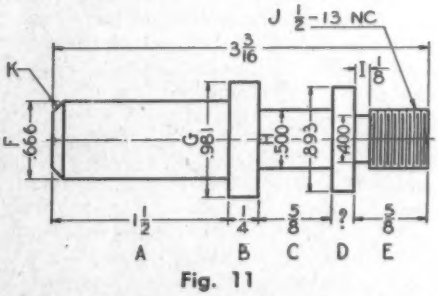

Fig. 11

It was possible to obtain this sort of information from a sighted group. The writer has been accumulating performance test data in the Turtle Creek High School Vocational Machine Shop for some time.

*High School, Turtle Creek, Pa.

For the test shown in Figure 11, he has obtained objective scores for 87 junior pupils. Suffice it to say for the moment that the distribution of grades fulfills a requirement for a satisfactory test.

Characteristics of the Sighted Group. The 15 sighted students were enrolled in the vocational machine-shop course in Turtle Creek High School. They were junior pupils and had had a background of two years of machine-shop practice. But the average time spent by each student on the lathe was only 170 hours. The balance of the time was employed operating the drill press, shaper, planer, and the bench grinder. Benchwork was also emphasized.

Athough the average time spent on the lathe by the blind was more than that consumed by the control group it should be understood that sighted individuals learn much by imitation and observation, but the blind must be taught every operation individually. For this reason, the background of the sighted group may help compensate somewhat for the additional hours of training spent by the blind.

Age. The average age for the 15 boys was 16.4 years. Two thirds of them were 16 years of age and the remaining one third were 17 years of age. The average age for the group is typical for junior vocational students.

Intelligence. I.Q. scores were taken from the school files. The tests used were group tests, one of which was the Henmon-Nelson. It was not possible to obtain all the I.Q. scores, but what scores there are (see Table I) will provide a rough idea as to their general intelligence. The average I.Q. rating for sighted boys was found to be 101. This average score is typical for vocational shop boys. A number of studies have demonstrated that average general intelligence plus spatial perception ability make a happy combination for success in the machine shop.

Characteristics of the Blind Group. The blind students both boys and girls taking the machine-shop course were regular resident day students enrolled in the Western Pennsylvania School for the Blind located in the Oakland district in Pittsburgh, Pa. They pursued a full-time schedule in the courses the school had to offer. Some of the students were enrolled in the straight academic course. A few of them took the general industrial course and some followed the commercial curriculum.

Age. The average age of the boys enrolled in the course was 20.1 years. For the girls, the average age was 18.4 years. The majority of both boys and girls were senior students. A few of them were juniors. Since the group was of mature age they were ready for the world of work.

Intelligence. The data for the I.Q. scores were obtained from the files of the Western Pennsylvania School for the Blind. The average Wechsler-Belleview Verbal I.Q. for the boys was found to be 113. And the average Wechsler-Belleview Verbal I.Q. for the girls was 118. These averages fall within the Bright-Normal range according to Wechsler's classification. Indeed, four students, two boys and two girls, were rated as having superior intelligence. This high average intelligence for the blind group as measured by the Wechsler-Belleview test is considerably above the average for regular vocational students.

Number Enrolled. When the National Defense Machine-Shop course began in September, 1944, in the Schenley High School Machine Shop there was a total enrollment of 19 of which 7 were girls and 12 were boys. During the year three students dropped out. At the termination of the course in May, 1945, 16 students remained on the active roll. During the second term, however, two girls were excused by the medical doctor and were not permitted to attend. Consequently, there remained 14 active students enrolled in the course. Of the 14 one student enrolled late in the year.

Hours of Training. The hours of training received by the blind students ranged from 39 hours to 400 hours. Slightly more than 56 per cent received over 200 hours of training, while almost 44 per cent had over 300 hours to their credit. The average number of hours spent during the year for the whole group was 232. The four students who completed the shop performance test spent an average of 328 hours during the year.

Attendance Record. The average daily student attendance for the whole year was 9.7. When it is remembered that these blind students carried a regular high school day program plus the extracurricular activities which the Western Pennsylvania School for the Blind provided and pursued, in addition to the machine-shop course from 6 p.m. to 10 p.m. for five nights a week during the first half of the course and from 7 p.m. to 10 p.m. for three nights a week during the second term, the average daily attendance represents a creditable showing. Furthermore, these students had no assurance that after completing the course they would be placed in industry. Such diligence in the pursuit of a "gamble" and the spirit of co-operation they manifested throughout the course reflects credit not only upon the students themselves but also upon the high type of training the Western Pennsylvania School for the Blind provides.

Visual Acuity. The fact that these students were enrolled in a school for the blind speaks for itself. But not all of the students were totally blind. Some of them could detect movements, some could perceive light, and one or two had slight vision in one or both eyes. But so far as the work of the machine shop is concerned the amount of vision they had might be considered useless.

Elemental Analysis of Test Data. Tables I and I (a) are presented to show elemental individual scores for both groups. Measurements A, B, C, D, and E are scalar measurements, and a maximum of 5 points was credited to the student if he came within the required tolerance of ± 1/64 of an inch. Measurements F, G, H, and I were micrometer sizes and the student obtained credit if he came within a tolerance of ± .002 of an inch. He received maximum credit of 10 points if the measurement was the exact size; if a measurement was off .001 of an inch, he received 9 points; if it was off .002 of an

TABLE I. Elemental Scores for the Sighted Group

Pupil	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*Finish*	*Total accuracy points*	*Accuracy letter grades*	*Time hours*	*I.Q. scores*
1	5	5	5	5	0	10	10	10	9	18	5	8	90	B	1.80	97
2	5	5	5	5	5	10	10	10	0	20	5	8	88	B	3.18	...
3	0	5	0	5	5	10	9	10	9	18	5	8	84	B	2.90	106
4	0	5	5	5	5	9	10	10	9	15	5	5	83	B	2.63	...
5	5	5	5	5	5	10	9	8	8	10	0	7	77	B	2.07	82
6	5	5	0	0	5	0	9	10	10	18	5	9	76	B	3.33	98
7	5	5	5	0	0	0	0	10	10	18	5	8	66	C	2.08	135
8	5	5	0	0	0	0	9	9	8	18	5	7	66	C	2.53	90
9	0	5	0	0	5	10	10	10	0	15	5	5	65	C	3.42	...
10	0	5	5	5	0	0	10	8	10	12	5	4	64	C	5.63	77
11	5	0	5	0	5	8	9	8	0	10	5	5	60	C	2.45	92
12	0	5	5	0	0	10	8	9	0	5	5	7	54	D	3.31	120
13	0	5	5	0	0	0	10	8	0	8	5	7	48	D	4.20	104
14	5	5	5	0	0	0	0	0	0	15	0	5	35	F	2.82	106
15	0	0	0	0	0	0	0	10	0	5	0	5	20	F	3.21	112

TABLE I(a). Elemental Scores for the Blind Group

Pupil	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*Finish*	*Total accuracy points*	*Accuracy letter grades*	*Time hours*
1	0	5	5	5	0	8	8	8	0	18	5	8	70	C	7.48
2	5	5	5	5	0	10	8	0	0	19	0	5	62	C	7.30
3	5	5	5	5	0	8	8	0	8	15	5	7	61	C	8.57
4	5	0	5	5	5	10	8	8	0	0	0	5	51	D	6.00

inch, he was awarded 8 points' credit; no credit was given if the measurement was off .003 of an inch. A maximum of 20 points could be obtained for the threaded portion (measurement J). The thread was tested with a nut. If the nut was a good fit, full credit was given. The student received 5 points for the chamfer, and the angle was tested with a bevel protractor. The finish of the job was awarded a maximum of 10 points. Only machine finish was required. Points were deducted for "dog marks" and failure to remove burrs, scratches, etc.

Sighted Group Scores. When the elemental scores are added they produce a total point score for accuracy. These scores will be noticed in Table I for the sighted group. If these scores are then computed by standard deviation formulas, an accuracy point score grade will be found. The mean and sigma values for 87 pupils were calculated. These values were used to arrive at a letter grade for the sampling shown in Table I. The grade distribution for the 87 pupils is as follows:

Distribution of Accuracy Grades for 87 Pupils		Distribution of Accuracy Grades for 15 Pupils	
Letter grade	*Per cent*	*Letter grade*	*Per cent*
A	3.5	A	0
B	29.8	B	40.0
C	36.8	C	33.2
D	20.7	D	13.4
F	9.2	F	13.4

The foregoing distribution of grades approximates the theoretical distribution for the normal curve of distribution. These data suggest that the test is not a particularly easy one for a sighted group of individuals. It becomes, therefore, a good measure to test the ability of a blind group and presents them with a difficult task to perform.

Blind Group Scores. When studying the test performance data for the blind group one important difference should be made clear. Although a test completed by a blind individual looked the same as one finished by a sighted boy the significant difference was in the method used to obtain the finished product. The sighted boy could "read a micrometer," but the blind operator was unable to use one. He was forced to make use of caliper measurements throughout the test, and it is known in machine-shop practice that the same accuracy cannot be obtained with spring calipers as with the micrometer caliper. It is true that in the hands of a skilled machinist the caliper can be made to work to close limits. But by and large the caliper is not used for close work. The micrometer measurements for the test are within pretty close tolerances. An allowance, therefore, was made for measurements F, G, H, and I. If the blind operator kept within the ± .002 of an inch tolerance, he received 10 points credit. If he kept within a tolerance of .008 of an inch, he received 8 points for that measurement. If the measurement was off more than .008 of an inch, he received no credit. All other measurements were graded by standards set for sighted pupils. It is interesting to note that the average accuracy attained by the four blind students is .010 of an inch. For example, blind student (1) achieved an accuracy of .008 of an inch. Student (2) was able to attain an average accuracy of .014 of an inch. Student (3) had an accuracy of .010 of an inch, and student (4) achieved an average accuracy of .008 of an inch for measurements F, G, H, and I. This showing is creditable, and it indicates that some blind persons could work within the tolerances required for "rough work."

Time Element. A study of the test data in Tables I and I (a) indicates that when judged by accuracy alone blind students appear at not great disadvantage. But in industry accuracy by itself is not enough; the time required to do the job is also vital. In many plants "standard times" are set on jobs, and, if the workmen meet the "standards" they earn an added bonus. Repeated failure to "make out" after "standards" have been applied may demote a workman to a lower classification. For this reason, the time it takes a blind student to finish a job has been given consideration.

The average time for the test job has been established fairly accurately. It is known that for 87 sighted pupils the average time is 3.64 hours. When different groups are tested the time will vary from group to group but it will not deviate significantly. Hence, the time it took four blind students to complete the job can be compared with the sighted group time. When this is done it will be noticed that there is considerable variance. The average time taken by the blind individuals is 7.34 hours. This means that for a given accuracy, on the basis of the foregoing data, the blind operator takes twice as long. One stipulation of the test requires that, if a piece is spoiled, the student may start the job over but the initial starting time is the one used. Three of the visually handicapped students spoiled their first pieces and began again. Had they managed to complete the first piece without spoilage the final times would have been lowered.

One time-consuming "bottleneck" appeared to be the handling time. There is no factual data to support the notion but from observation at least, the time required to mount the chuck, set up and adjust the cutting tool, and adjust the cross slide for depth of cut appear to be the time-consuming elements. The actual machine cutting time, apart from the number of cuts required to turn to the finished size, did not appear to be as time consuming as the handling time. All of which indicates that a more refined analysis of times in machine-shop work for the blind is required. The teaching techniques need also to be refined to the point where some of the "bottlenecks" may be eliminated.

(To be continued)

A Centralized Training Aids Department

*S.Sgt. Aaron Ducker**

Teachers frequently think of a new chart or model as a method of demonstrating some instructional point. Many schools have visual aid departments which can produce or procure the desired training aids. Some teachers prepare these teaching aids themselves, with the assistance of several advanced students. Others lacking the facilities and equipment can do nothing about it.

The teacher who succeeds in putting his idea to work finds that it helps him to get his point across, but other teachers with the identical teaching problem may never hear about it or see it. In order to enable school systems to obtain maximum benefits from them, new training aids should receive the widest possible distribution.

It is hoped that the Federal Government will soon make available to schools that heretofore could not acquire it, some of the surplus training equipment formerly used by the armed forces and industries engaged in war production. If this is done, the problem confronting all schools will be the same as that faced by military training establishments throughout the war, namely, to secure maximum use of this equipment through co-ordinated scheduling, and to keep it in operating condition through a program of continuous maintenance.

One of the outstanding achievements in army training is the centralized training aids organization which has been developed for the production of audio-visual and other training aids. At Aberdeen Proving Ground, Md., an organization known as the Training Aids Branch supplies the multisensory training aids for the instruction of thousands of ordnance soldiers.

Here, under the direction of the Chief of the Training Aids Branch a battery of highly skilled former commercial artists,

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Fig. 1. Chart layout and design. Fig. 2. (at right) Artists and draftsmen at work

prepared many charts and exhibits. Here, also, a group of craftsmen developed new working models, and professional photographers took pictures of tanks and guns and made pictorial enlargements of tiny working parts so that they may be clearly seen by the student. Experienced men also supplied and operated films and film strips, loud-speaker systems, and other electrical equipment used in training. Trained personnel prepared and reproduced by mimeograph, note taking aids, training publications, technical maintenance manuals, and field service bulletins. All these training aids flow in a steady stream from the Training Aids Branch to every classroom and outdoor instructional area in the training center.

The Training Aids Branch has developed and supplied many models and charts and other training aids for ordnance technical instruction. Outstanding among them are an enlarged cutaway model of a carburetor, a transparent plastic working model of an antiaircraft gun, and a huge terrain model of a theater of operations showing ordnance units at work.

Photographs play an important part in Ordnance instruction. They are especially useful for lessons in nomenclature, identification of material, and as guides in the disassembly and assembly of complex working parts. The Training Photographic Unit produces many prints including 30 by 40-in. blowups and even large photo murals which have proved to be very effective in aiding instruction.

Several things may be learned from the way the Training Aids Branch did and still does its work. A central agency in any school system which is responsible for training aids distribution could also pool the ideas of many teachers in varied fields, develop them and distribute their ideas by having them acted upon quickly, and receiving some tangible form of recognition and commendation for those ideas which prove to be especially valuable.

Of course, it would probably be too expensive for many small schools or school organizations to maintain all the highly specialized personnel to do this work in the manner which the army carries it out. However, central training aids units representing many small schools could perform the necessary liaison with the commercial manufacturers and other producers of

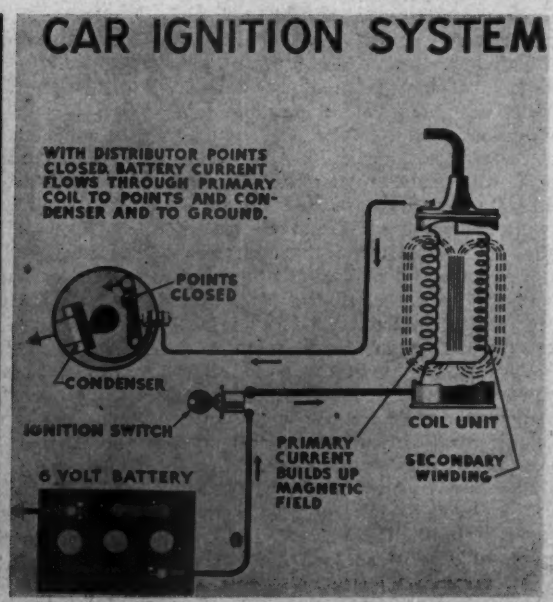

CAR IGNITION SYSTEM
WITH DISTRIBUTOR POINTS CLOSED, BATTERY CURRENT FLOWS THROUGH PRIMARY COIL TO POINTS AND CONDENSER AND TO GROUND.
POINTS CLOSED
CONDENSER
IGNITION SWITCH
6 VOLT BATTERY
PRIMARY CURRENT BUILDS UP MAGNETIC FIELD
COIL UNIT
SECONDARY WINDING

Fig. 3. Silk-screen process reproduction. Fig. 4. (at right) Diagrammatic chart — silk-screen reproduction

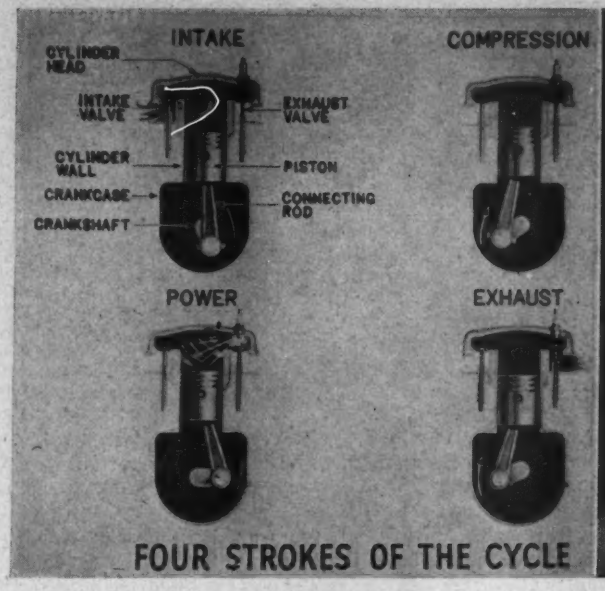


Fig. 5. Diagrammatic chart — air brush reproduction. Fig. 6. (at right) Model makers at work

training aids in having them prepared and distributed throughout the school systems.

In order to get as many students as possible to observe training films, film strips, etc., and yet not disrupt current school programs, careful scheduling and distribution is necessary. The full use of all the available facilities can only be assured by having full time personnel to deliver, operate, maintain, and repair all the equipment.

The Training Aids Branch's practice of keeping teachers informed about the latest training aid accessions by means of a weekly circular might well be applied by many school systems. Tied in logically with a simple method of requisitioning training aids, this system would prove very effective in keeping instructional methods up to date.

Science and industry have been con-

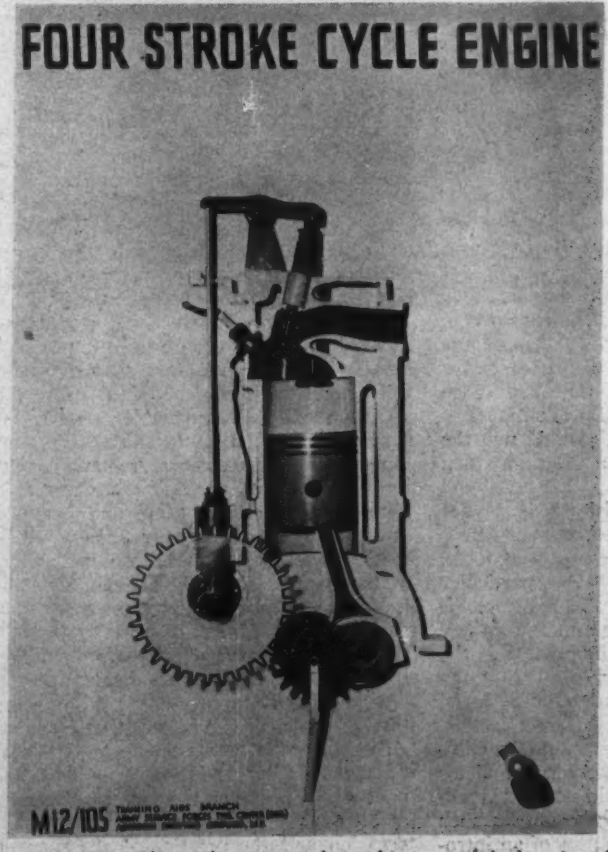
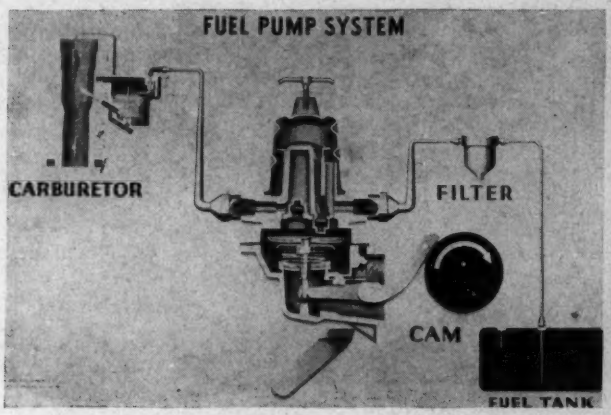


Fig. 7. Three-dimensional working model showing function. Fig. 8. (at right) Three-dimensional working scale cutaway model of carburetor (may be disassembled and re-assembled)



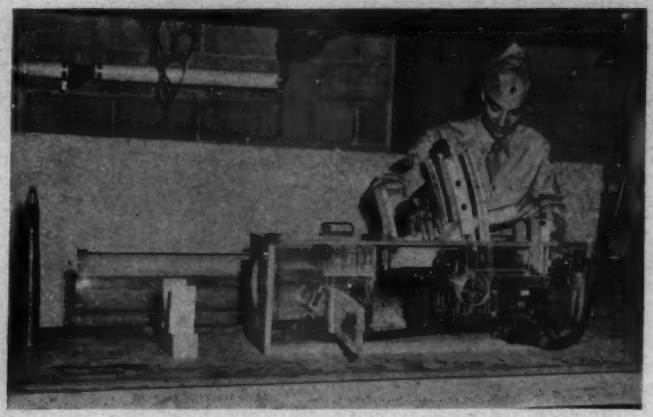


Fig. 9. Combination 3-dimensional cutaway working model and chart, showing function. Fig. 10. (at right) Plastic cased operating model of 40mm. gun. Shows complete cycle of operation of component parts; permits detailed study of any one operational step

tinuously enlarging the number of devices which may someday find a useful place as training aids in the classroom or the shop. Technicolor films, television, radio transcriptions, wire recording — all these have found or will ultimately find their way into our schools. These new machines and devices will require skilled maintenance and careful distribution. Some states now have departments of visual education which concern themselves mainly with the use of sound films and slides in training. Their service could be extended to include the distribution of many different types of multisensory training aids through county or district units similar to the one discussed in this article. Eventually, a highly efficient central organization, manned by trained personnel will be needed in most school systems in order to carry on the work properly.

Introducing Speakers to An Audience

*Charles F. Wells**

As leaders in school and community affairs teachers of industrial arts and vocational education are frequently called upon to introduce speakers to an audience. As club advisers, or as chairmen of school program committees, they often have such an honor thrust upon them, and discover that the "honor" becomes a task which is not always as easy as it appears.

The chief purpose of a speech of introduction is to create in the minds of listeners an interest in both the subject and the speaker. It does much to bring the speaker and audience together in a spirit of informality and friendliness. An audience needs to know something about the speaker before it can develop respect for his ability to speak on any subject. Also a few remarks concerning the significance of the topic are needed to arouse interest. Perhaps most important of all a good speech of introduction helps break the ice, secure audience attention, and bridge the gap between the speaker and audience.

An introduction should be brief and to the point. The audience wishes to hear the speaker, not the chairman. A long, rambling introduction often leaves the audience tired and bored. The chairman should remember that he is not the chief speaker, and that he should not steal the spotlight by expressing his own views on the subject. On the other hand, an introduction that is too brief and abrupt is almost discourteous, and leaves the audience wondering about the merit of the subject and the importance of the speaker.

Although brief a speech of introduction is governed by a very definite pattern and set of rules. It usually contains four separate parts: the subject of the speech, the speaker, the title of his talk, and the actual presentation of the speaker to his audience. A successful chairman once stated his formula for introductions as "build up the subject, build up the speaker, give the speech a title, and then turn him loose."

To "build up the subject" it is not necessary to make a speech, but merely to point out the timeliness of the topic, its appropriateness for the particular occasion, and value for the audience. A few well-chosen remarks about the subject will serve to excite interest so the audience will listen eagerly.

The section of an introduction designed to "build up the speaker" should include something about his background or qualifications, his position or experience and his accomplishments. If he has traveled extensively or visited foreign countries such information is a desirable part of an introduction. A brief reference to books or magazine articles written by the speaker help to establish him as a person of authority in the minds of the listeners. This personal data is usually available from the speaker himself or from the organization he may be representing. Occasionally a speaker suggests some special item of information he wishes to have included in the introduction, in which case the chairman should be sure to follow the suggestion.

It is always unwise to introduce a speaker with a long series of personal anecdotes. These are sure to make him feel embarrassment, and to give the audience an uncomfortable feeling of sympathy for the unfortunate object of the stories. A few sincere remarks about the speaker are much more acceptable than flattery, exaggeration, and personal comments. The chairman should avoid specific references to the speaking ability of the speaker since these remarks might lead the audience to expect far more than he is able to deliver.

Humor is always effective for breaking the ice and putting an audience at ease, but it must be appropriate and in good taste. Some chairmen believe that considerable humor is necessary even if it is "dragged in by the heels" and has no particular bearing on the subject. The style of introduction should fit the mood of the occasion and the prestige of the speaker. Formal occasions demand a serious introduction with a minimum of humor,

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whereas too much dignity at an informal gathering might appear stiff and stilted. Humor should be used carefully and sparingly for the best effect; too much levity, slang, or joking is not always in good taste at public meetings.

The choice of language used by a chairman will depend upon the type of meeting, but usually it is desirable to employ simple effective English which is neither over the heads of the audience nor below their level of comprehension. Use of overworked expressions such as "the speaker needs no introduction" should be avoided. If he "needs no introduction" why should the chairman waste time doing it? Trite and hackneyed expressions have been overworked so much that they have lost their orginal effectiveness. The chairman should learn to use fresh, vital language to give individuality and originality to his speech. Needless to say the use of colloquialisms, improprieties, and slang should be avoided by the chairman who wants to be a community leader.

Material for an introduction should be carefully prepared and organized to insure inclusion of all necessary information in the most effective order. The chairman should have the facts sufficiently well in mind to make the use of notes unnecessary. If the chairman is to break the ice he must present the introduction directly to the audience without holding up notes to create a slight psychological barrier between him and the audience.

A title for the speech is usually supplied by the speaker, and should be given as the third part of the introduction. A title serves to tell listeners in advance what phase of the subject is to be covered, and helps to stimulate an interest in the subject. If an interest arousing title is not possible, the chairman may announce the general subject as a substitute.

The final part of an introduction is the actual presentation of the speaker to the audience. The chairman should be sure of the name of the speaker, and the correct pronunciation. Nothing is more embarrassing than to ask the speaker for his name during the speech of introduction, or to have him correct the pronunciation of his own name after he has started to speak. No one cares to have his name mispronounced, and the chairman must exercise considerable care in handling unfamiliar names. If it is an unusual name the chairman should ask the speaker for the pronunciation before the meeting, and then say it several times during the introduction so the audience will also know the correct pronunciation.

When the guest speaker is well known to the audience it is wise for the chairman to save the name until the end of the introduction. Frequently the mere mention of a popular speaker's name is a cue for applause which breaks the continuity and effectiveness of the presentation. It is better to refer to the speaker by such impersonal phrases as "our guest" or "the speaker" until the end when the mention of his name will serve as a climax of the introduction to set off the applause.

Most chairmen use a phrase such as "I am pleased to introduce ———," "I am happy to present ———," "It is my privilege to introduce ———," or some similar expression at the end of an introduction. This should be spoken directly to the audience; clearly and distinctly so everyone will understand. Then, and not until then, the chairman should turn so the speaker will know he is expected to take the floor. The person making the introduction should avoid giving the speaker false starts by turning to him frequently as though he were expected to rise, and then going on with more of the introduction to the audience.

When the actual presentation is finished the chairman should move back slightly and remain standing until the speaker rises to acknowledge the introduction with a nod of his head or the more formal "Mr. Chairman." If the speaker fails to acknowledge the introduction the chairman should sit down quietly and unobtrusively when the speaker commences to address the audience. The task is now finished for the chairman, but instead of a great sigh of relief at a job well done he is expected to listen to the speech with an alert, interested expression that will set a good example for the audience.

Finally, at the end of the speech the chairman should express sincere thanks to the speaker, and then go on to the next item of business or adjourn the meeting if the program is completed.

Problems and Projects

WALL SHELF

LYLE M. GARNETT

Milwaukee Vocational School

Milwaukee, Wis.

Purpose:

1. To make a hanging wall shelf.
2. To use the jointer, circular saw, and the jig saw.

Technical Information:

This wall shelf is made of rather thin material, and, therefore, it is impossible to cut the dado joints at the end of the shelves very deep. You will notice that the dado is only ⅛ in. deep and that the shelf is held together by the use of small roundhead screws either blued or brass. The roundheaded screws give a bit of added ornamentation to the surfaces.

For the advanced student who may choose to make this project it may be possible to make two small sunburst carvings and glue them to the eliptical surfaces in the center of the design on the end boards. This carving should be no more than 3/32 in. thick.

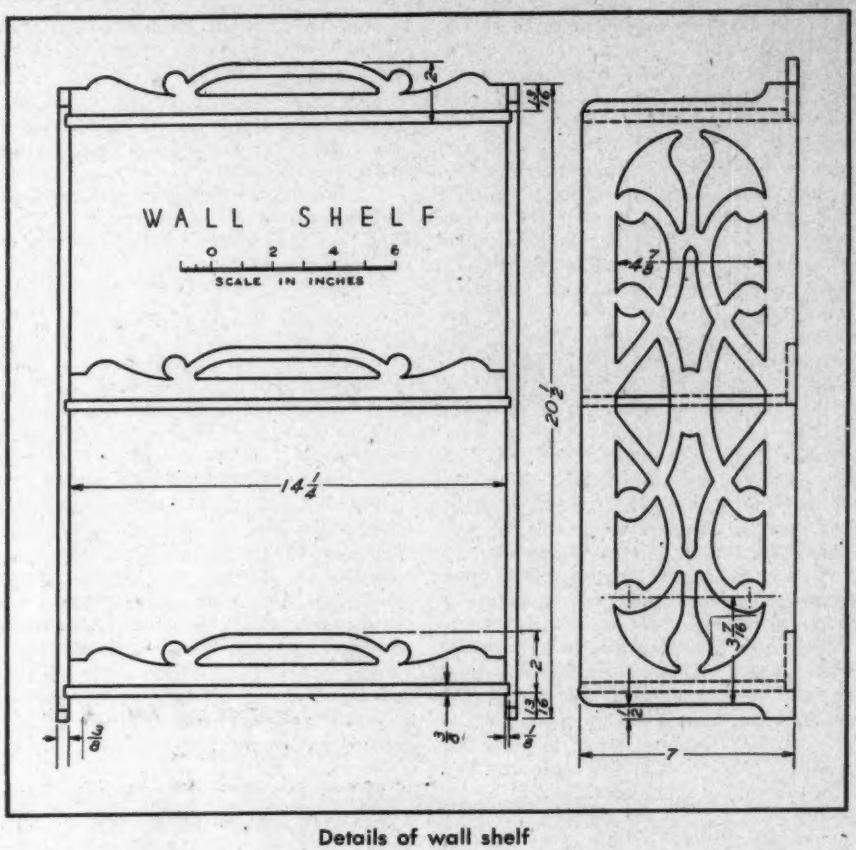
STOCK BILL

No. of Pieces	*Name of part*	*Size*
2	Ends	⅜ x 7 x ?
3	Shelves	⅜ x ? x 14½
3	Shelf backs	⅜ x ? x 14½
18	R.h. screws	No. 4 x 1
12	Brads	No. 18 x 1¼

Tools and Machines: Jointer, ¼-in. twist drill, ⅛-in. twist drill, circular saw, drill stock, screw driver, jig saw, hammer, sandpaper.

Construction Procedure:

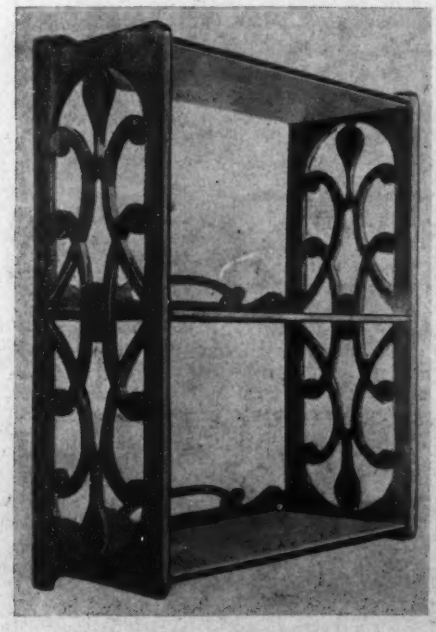
1. Select the material from which you intend to make the wall shelf.
2. Complete the stock bill taking the finished dimensions from the drawing.
3. Cut the rough boards to a size about ½ in. larger than the dimensions given in the stock bill. This is done so there will be material with which to square the boards later.
4. Reduce the boards to the thickness of ⅜ in.
5. Plane one edge of the boards straight and square with the face of the board. This should be done on the jointer.
6. Set the circular saw to make a cut 7 1/16 in. wide and rip the two endpieces to this width.
7. Set the circular saw to cut 6 11/16 in. wide and rip the three shelf boards to the correct widths.
8. Reset the circular saw again, this time for a width of 2 1/16 in., and rip the three pieces that are to form the backs of the shelves.
9. Set the jointer to make a cut exactly 1/16 in. deep. Make a very short trial cut on the end of each board and measure the remaining thickness. Make whatever adjustments are necessary.
10. Make one cut on the rough edge of each piece. This edge will be roughened because of the surface left by the circular saw.
11. Set the circular saw crosscut fence to make a square cut.
12. Saw one end of each of the boards so it will be perfectly square. The edge that is held against the fence of the saw should be marked in some way so the same edge can again be placed against the crosscut fence, when cutting the second end, or if there are joints to be cut on the board later.
13. Set the crosscut gauge so as to be able to cut a length of 20 ½ in. Hold the marked edge against the crosscut fence and the



Details of wall shelf

squared end of the board against the length gauge, and cut the pieces to their respective lengths.

14. Reset the crosscut gauge to make a cut of 14 ¾ in., and cut the three shelves to length. Be sure to take the precaution to see that the marked edge is again held against the fence of the saw and that the squared end is against the length gauge.



Wall shelf by Lyle M. Garnett

15. Cut the three pieces for the back of the shelves to a length of 14 ½ in.

16. Place enough of the dado saws on the arbor of the circular saw to be able to make a cut ⅜ in. wide. Adjust the height of the arbor so the saw will make a cut ⅛ in. deep. Make a trial cut on a piece of scrap material and ask the instructor to check the setup.

17. Adjust the ripping fence of the circular saw to a position 13/16 in. from the dado saw.

18. Make a dado cut on each end of the larger boards. Hold the boards against the crosscut fence and butt the ends of the boards against the ripping fence as a gauge.

19. Adjust the crosscut fence so a dado may be cut in the center of the boards and make a third dado cut. This time the end of the boards may be butted against the length gauge on the crosscut fence should there be one there.

20. Nail the two endpieces together. Use ¾-in. brads for the operation and be sure that the dado joints come together and that they meet perfectly.

21. Lay out the pattern for these endpieces on a piece of paper. A piece may be made equal in size to that of the end board and then folded to ¼ the size. The pattern may then be drawn on the quarter piece, and cut out with a pair of scissors.

22. Open the pattern and lay it on the end boards and trace around it with a sharp pencil.

23. Drill a ¼-in. hole through the boards at every place where there is to be a hole in the pattern.

24. Insert the jig-saw blade through one end of the holes drilled through the stock. Saw out this pattern very carefully and continue from one part of the pattern to the next until the entire pattern has been cut out.

25. Repeat this same procedure with the pattern on the backs of the shelf.

26. Sandpaper all surfaces of the boards with No. ½ grit of paper for the coarse sanding and a No. 2/0 grit of paper for the finer sanding. Be sure to sand all of the surfaces of the cutout pattern too.

27. Space off the three holes for the screws that go into the ends of each of the three shelves. This should be done by measuring a point 1 in. from the edge of the board and in the center of the dado. The third point should be midway between the edges of the board.

28. Place the shelf boards in the dado grooves and drive the screws home in the ends of the shelves. Use the No. 4 by 1 in. r.h. screws for this operation.

29. Place the shelf backpieces so the bottom of the piece is flush with the bottom of the shelf board and nail it into place by using the No. 18 by 1 ¼ in. wire brads. Also nail through the end boards into the ends of the shelf backpieces.

30. Sandpaper the entire shelf with fine sandpaper prior to the finishing process.

31. Use a finish in keeping with the type of material used in the construction of this wall shelf.

PLASTICRAFT CANDLEHOLDER

S/SGT. EDWARD E. STARK

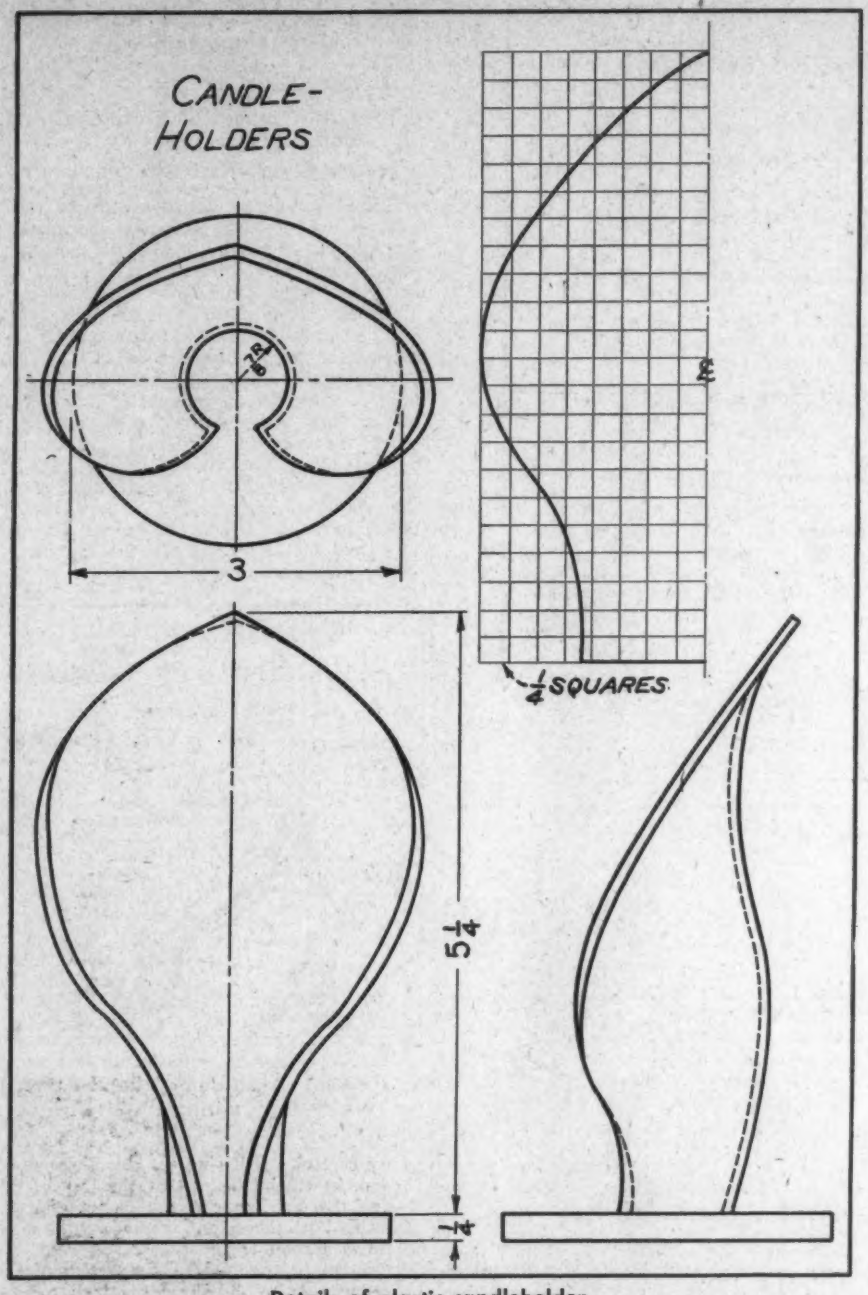
Vocational and Avocational Branch
AAF Convalescent Hospital

Cochran Field, Macon, Ga.

The attractive candleholder, shown herewith, is very easy to make. It may be fabricated from either the cellulose acetate (Lumarith) or methyl-methacrylate (Lucite, Plexiglas) type materials. This particular project is so simple in its construction and yet so gratifying in the accomplished piece, that it makes it particularly desirable for beginning students. It is well to keep in mind that nothing is quite so stimulating to the beginner, as a successful, attractive first project.

Plastic candleholder

Many novel surface effects and finishes may be applied to these candleholders. Attractive results have been obtained with the use of analine dyes, coloring either half, or the complete project. Drawfiling the edge surfaces of both clear and dyed pieces produces very interesting variations. Sand blasting or frosting has been used successfully, particularly on the bottom surface of the stand. The more advanced students might further enhance the looks of their project by cementing overlays of initials or monograms on the base piece. Care must be taken in using the same kind of material throughout the job, as the joining together of two different types of plastic is, at best, difficult for the beginner.



Details of plastic candleholder

BILL OF MATERIAL

No. of pieces	*Material*	*Size*
2	Plexiglas	¼ x 3 x 3 in.
2	Plexiglas	⅛ x 5½ x 5½ in.

Ethylene dichloride (or acetone), cellulose cement, analine dye, 3/0 sandpaper, 600 grit Speed-wet paper, and buffing compound.

Tools

Dividers	Jig or coping saw	Coarse file
Scribe	Fine file	⅜-in. forming mandrel
Bench vise	Heating oven	Buffing wheel
Rule	Shallow tray	Dye tank
Heavy gloves		

Procedure

1. Lay out pieces as shown or vary shape of the basepiece as you please.
2. Saw out design of leaves, allowing approximately 1/32 in. for shaping and finishing.
3. Repeat with base pieces.
4. Using protected jaw surfaces, clamp stock securely in bench vise.
5. In even strokes, file down to scribed line.
6. Sand edges with No. 3/0 sand paper — then 600 grit speed-wet paper — then buff edges.
7. Repeat this procedure with all four pieces.
8. Mount forming mandrel in vise securely allowing approximately 3 in. to extend beyond the jaws. (*a*) Particular attention must be paid to see that the surface of this end of the forming mandrel, whether made of wood or metal, is smooth, so as not to leave a marred surface on the plastic piece to be formed around it.
9. Heat leaf shapes in dry heat oven (preferably electric) to temperature between 225°–300° F. for Plexiglas or 175°–200° F. for Lumarith.
10. When piece becomes soft and pliable, remove from oven. Imagine the forming mandrel as being the candle and bend softened plastic around it.
11. Hold bottom of leaf firmly around forming mandrel with one hand then tip the end of the leaf out in a natural looking shape with the other hand.
12. Hold until piece cools sufficiently to retain its new shape. Repeat with second leaf.
13. Remove leaf from forming mandrel and place in correct position on base piece.
14. Adjust the seating of the piece to suit by filing off portions of the leaf base.
15. Add decorative effects (sand blast, frost, or dye).
16. Cover surface of shallow tray with appropriate cementing solvent. Stand leaves on their base in solvent for approximately two minutes. Remove and immediately place in position on project base. Allow to set for 24 hours. Where cellulose material is used, apply coating of cement, press gently into position and allow to set for 24 hours.
17. Wash with soap and water, rub to luster with clean, soft (flannel) rag.

ORNAMENTAL TIN CRAFT

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(Continued from page 173 of the April, 1946, issue)

Ice or Sandwich Tongs

The flowing lines of these modern ice or sandwich tongs make it suitable for any dining or lunch table. This project has particular charm because of the polished copper finish and the domed effect caused by the addition of chair gliders. It should be noted that the fingers of the tongs are shaped to grip ice cubes as well as to handle sandwiches. Double thickness sheet tin gives the proper spring for such a project. The only bending or forming required can be done easily over a piece of ¼-in. pipe. The designs offered in Figure 2 are very flexible and allow for numerous alterations and changes.

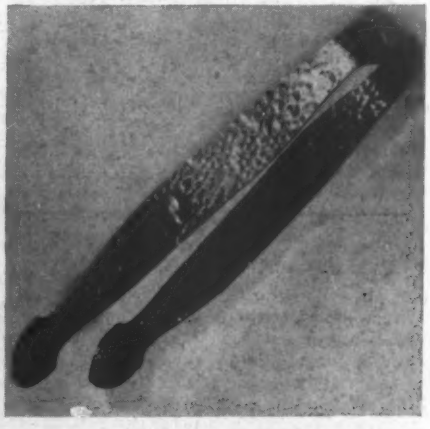


Fig. 1. Ice or sandwich tongs

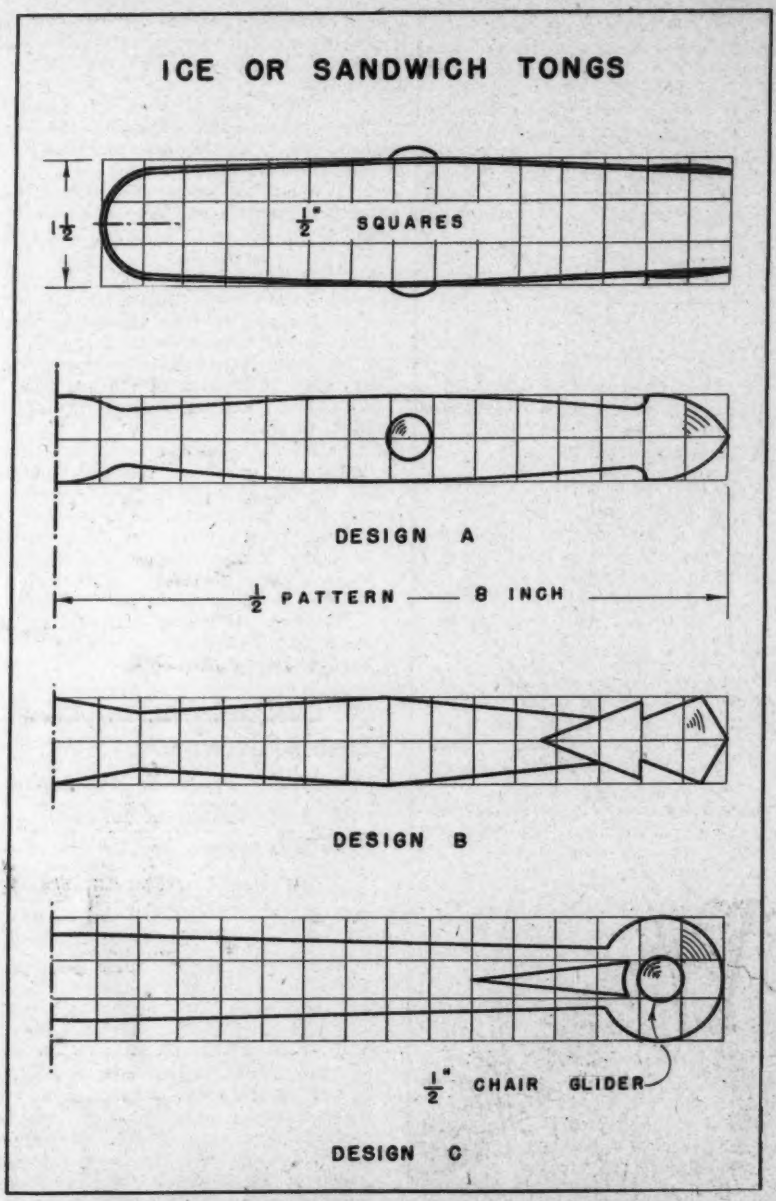


Fig. 2. Alternative designs of the ice or sandwich tongs

BILL OF MATERIAL

No. of pieces	*Item*	*Size*
2	Sheet tin	1¼ x 16½ in.
2	Chair gliders	½ in.
	Solder, flux, steel wool	

Tools: Alcohol burner, asbestos sheet, brush, carbon paper, copperplating setup, emery cloth, files, flat iron, heating device, jeweler's saw frame and blade, lead or wood block, lead weight, peening hammer, pencil, ¾-in. pipe, rule, scriber, soldering copper, yellow tempera water color paint, and tin snips.

Procedure

1. Use design as shown in Figure 2, or develop an original design.
2. Cut out 2 pieces of tin stock.
3. Solder one side of each piece.
4. Sweat both pieces together with hot flat iron. Weight the soldered parts together immediately as more is sweated.
5. Apply coat of yellow tempera water paint to one side of sweated piece for design transfer.
6. Lay design sheet and carbon paper over painted portion and trace design.
7. Cut out tongs with jeweler's saw frame and blade.
8. File and dress edges with emery cloth.
9. Form fingers on wood forming block.
10. Peen exposed surfaces on lead or wood block.
11. Remove prongs from chair gliders, file edges.
12. Apply solder on edge of gliders.
13. Sweat-solder gliders in place with alcohol torch.
14. Bend tongs over ¾-in. pipe as shown.
15. Rub tongs with steel wool and prepare for plating.
16. Apply thick coating of copper.
17. Polish project with steel wool. Use cloth to prevent touching metal with hands.
18. Apply coat of clear metal lacquer and allow to dry.

JOB SHEET — HOW TO WIRE A DISTRIBUTOR CAP

A. C. GOODRICH

West Allis School of Vocational and Adult Education

West Allis, Wis.

Reason for lesson: It is frequently necessary for a mechanic to re-wire the distributor cap on an engine. In case the mechanic was the one who removed the wire and he had the foresight to mark the cap, this is not a difficult job. However, a much more complicated problem arises when the person removing the wires neglects to mark the cap, or in the case where the wires and cap have been destroyed as in the case of a fire. For this reason it is important that the mechanic should be able to figure out the correct method of replacing the spark plug wires in the cap so that the cylinders will be fired in the proper firing order. With a knowledge of the basic principles involved he will be able to figure out the wiring of the distributor circuit of any engine.

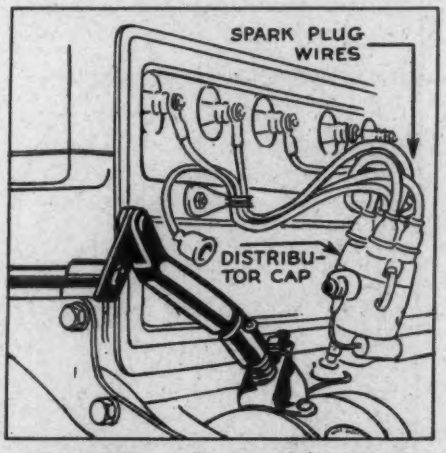


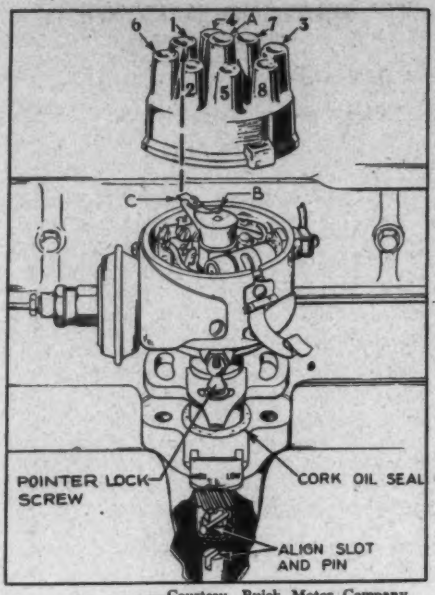
Fig. 1. View of automobile engine showing distributor head and wiring

By carefully following the directions given herein, it will be found that the task of rewiring the distributor circuit is not difficult, and that both theory and method can be mastered in a short time.

General Information: The *function* of the distributor is to distribute the high tension spark from the coil to the spark plugs in the proper firing order, and at the proper time.

The spark enters the distributor at the center terminal *A*, Figure 2, and passes through the spring contact *B* to the metal portion of the rotor *C*. The spark then jumps from the end of the rotor to one of the small metal segments on the inside of the cap and passes out through one of the spark plug terminals as shown by the dotted line in Figure 2.

The rotor is mounted on the circuit breaker shaft in such a position that it will always be lined up with a spark plug terminal in the distributor cap every time the points open to produce a spark. As the rotor revolves, the high tension spark jumps from the end of the rotor to one of the spark plug terminals each time the points open. For this reason the spark plug wires must be placed in the dis-



— Courtesy, Buick Motor Company

Fig. 2. Distributor cap and rotor

tributor cap so that the cylinders are fired in the proper firing order.

Procedure:

I. *Determine the Firing Order:* On many engines the firing order is stamped on the valve spring cover, cylinder block, or manifold. In case the firing order is not stamped on the engine the instruction book or some other source of information such as the "Standard Auto Electrician's Manual" should be consulted. Some of the most common firing orders are:

4-Cylinder, 1-2-4-3 or 1-3-4-2
6-Cylinder, 1-5-3-6-2-4 or 1-4-2-6-3-5
8-Cylinder, 1-6-2-5-8-3-7-4 or 1-4-7-3-8-5-2-6

II. *Determine the Direction of Rotor Rotation:* Crank the engine and notice the direction of rotor rotation. In some cases you may find this stamped on the rotor.

III. *Place Number One Piston at T.D.C. of the Compression Stroke:* Top dead center (T.D.C.) of the compression stroke may be found by removing the spark plug and inserting a cork in the spark plug hole. Some manufacturers term this position "upper dead center" and stamp U.D.C. on the flywheel. Crank the engine until the compression forces the cork out of the spark plug hole. Continue to crank the engine until the timing marks T.D.C. 1-6 on the flywheel line up with the pointer on the flywheel housing as shown in Figure 3. In the case of a valve-in-head engine T.D.C. of the compression stroke may be very easily determined by removing the rocker arm cover and watching the closing of both valves. In some cases the timing mark may be a small steel ball inserted in the face of the flywheel as on the Chevrolet or Oldsmobile. See Figure 4.

Many manufacturers place the timing marks on the vibration dampener as shown in Figure 5.

The location and method of placing the timing marks on different makes of engines should be studied and interpreted before attempting to perform this operation.

IV. *Determine the Position of the Rotor:* With the piston of number one cylinder at T.D.C. of the compression stroke the contact end of the rotor will be pointing to one of the distributor cap terminals. Remove the cap as shown in Figure 2, and determine which terminal is in alignment with the rotor.

V. *Wire the Distributor Cap:*

1. Place the spark plug wire from number one cylinder in the distributor cap terminal which lined up with the rotor when number one piston was at T.D.C. of the compression stroke. (Cylinders are numbered from the front of the engine to the back.)

2. Insert the rest of the spark plug wires in the distributor cap terminals in the proper firing order following number one in the direction of rotor rotation.

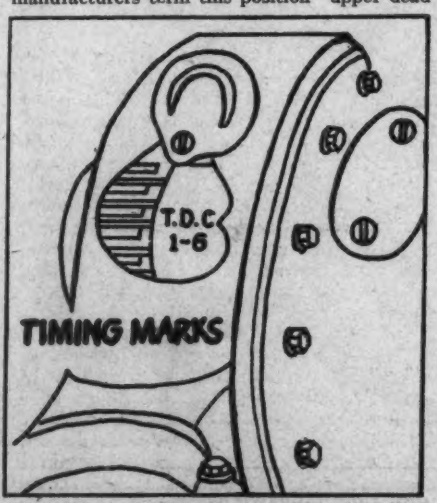


Fig. 3. Timing marks on flywheel

— Courtesy, Oldsmobile Motor Company

Fig. 4. Steel-ball timing mark

Figure 6 shows a properly wired distributor for a four-cylinder engine. When number one piston was at T.D.C. of the compression stroke the rotor was lined up with the terminal marked "X." The firing order for this particular engine is 1-2-4-3. The rotor travels in a counterclockwise direction as indicated by the arrow on the cap. In order to deliver the spark to number one cylinder the spark plug wire from this cylinder should be placed in the distributor cap terminal marked *X*. The spark plug wire from the next cylinder to fire (2) is placed in the terminal to the right of number one terminal (away from No. 1 terminal in the direction of rotor rotation). The spark plug wire from the next cylinder to fire (4) is placed in the next terminal in the direction of rotor rotation. The spark plug wire leading from the last cylinder to fire which is number three is placed in the next terminal around the cap in the direction of rotor rotation.

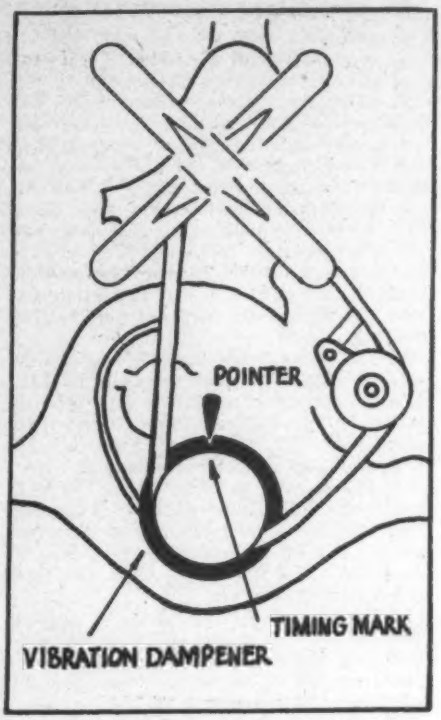


Fig. 5. Timing marks on vibration dampener

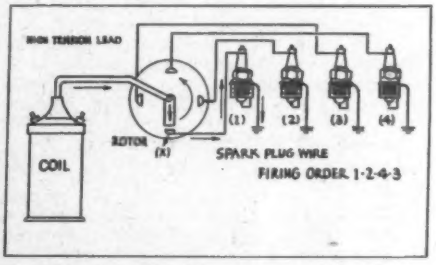


Fig. 6. Distributor circuit for a four-cylinder engine

3. Insert the high tension lead from the coil in the center terminal of the distributor cap.

REFERENCES

Dykes, *Automobile Encyclopedia*, pp. 188, 197, and 412 (Chicago: Goodheart-Wilcox Co., Inc.).
Kuns, *Automotive Essentials*, pp. 215 to 218, and 228 (Milwaukee: The Bruce Publishing Co.).
Kuns, *Automotive Service Vol. 2*, pp. 305 to 309 (Milwaukee: The Bruce Publishing Co.).

TEST

How to Wire a Distributor Cap

Multiple-Choice

Directions: Each of the following statements can be correctly completed by one and only one of the numbered expressions. Choose the correct expression to complete the statement and underline it.

Example: The eraser on the end of a lead

pencil is made of: (1) fiber, (2) rubber, (3) graphite.

1. The function of the distributor is to: (1) increase the voltage in the primary circuit, (2) interrupt the secondary circuit, (3) distribute the high tension spark to the various spark plugs in the proper firing order.

2. The high tension spark from the coil enters the distributor through: (1) the rotor, (2) the wires leading from the spark plugs, (3) the center terminal of the distributor cap.

3. The electrical connection between the center terminal of the distributor cap and the rotor is made by means of a: (1) spring contact, (2) copper wire lead, (3) solid connection.

4. The metal end of the rotor delivers the spark to the spark plug terminals by: (1) actually coming into contact with the terminal, (2) passing very close to the spark plug terminal and allowing the spark to jump, (3) turning in a clockwise direction.

5. The body of the rotor is made of: (1) metal, (2) an insulating material, (3) copper.

6. The distributor rotor may be placed on the circuit breaker shaft in: (1) two different positions, (2) only one position, (3) three different positions.

7. The distributor cap for a six cylinder car using a single contact rotor has: (1) twelve spark plug terminals, (2) six spark plug terminals, (3) three spark plug terminals.

8. Each time the circuit breaker points open the distributor rotor should be: (1) lined up with one of the spark plug terminals, (2) halfway between two of the spark plug terminals, (3) just past the spark plug terminal.

9. The spark plug wires must be placed in the distributor cap according to the: (1) proper firing order, (2) circuit breaker point gap, (3) number of terminals on the distributor cap.

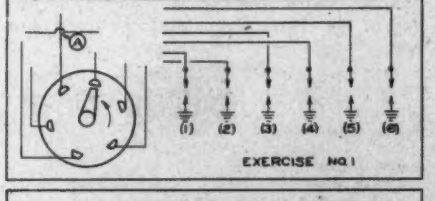
10. The most common firing order for a four-cylinder engine is: (1) 1-2-4-3, (2) 1-2-3-4, (3) 1-3-4-2.

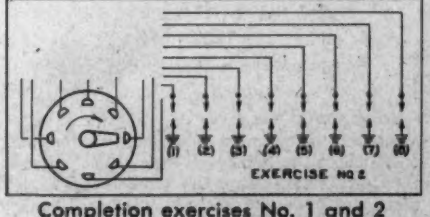
11. The most common firing order for a six-cylinder engine using a single contact rotor is: (1) 1-3-6-2-4-5, (2) 1-5-3-6-2-4, (3) 1-6-3-2-4-5.

12. The direction of rotor rotation is often stamped on the: (1) engine block, (2) rotor, (3) circuit breaker plate.

13. When the piston is at T.D.C. it is at: (1) the end of an upward stroke, (2) the end of a downward stroke, (3) the beginning of an upward stroke.

14. Timing marks may be found on the: (1) valve spring cover, (2) vibration dampener, (3) flywheel housing.





Completion exercises No. 1 and 2

Completion Exercises

Directions: Exercises Nos. 1 and 2 are two partially completed distributor wiring diagrams. You are to complete the diagrams. Use straight parallel lines when completing the circuits. In each case the rotor in the diagram is lined up with the spark plug terminal for number one cylinder. Use 1-5-3-6-2-4 as the firing order in completing exercise number one and 1-6-2-5-6-3-7-4 as the firing order for exercise number two. Make a small loop in one of the wires whenever they cross as shown at point "A" in Exercise No. 1.

"Too much emphasis cannot be placed on handicrafts. . . . It is safe to say that over 50 per cent of the men practice some form of handicraft." — (Letter from an officer stationed in the Southwest Pacific.)

The value of property destroyed by fire in 1945 was $455,000,000, or 7 per cent more than in 1944. — *National Safety Council.*

WHITTLING-JACKKNIFE TECHNIQUE

W. BEN. HUNT

Hales Corners, Wis.

(Continued from page 139 of the March, 1946, issue)

Little Fisherman

The little fisherman group, shown in Figure 203, consists of three whittled pieces. The pieces, in this case, were whittled out of basswood. The grain should run up and down in both boy and dog. The whole assembly could be whittled in one piece, but doing each piece separately is a lot easier. The boy and the dog are fastened to the base by drilling small holes in the right foot of the boy and the left front foot of the dog and then setting them on a small brad driven up through the base from below. See Figure 203. A drop of glue or cement on each of the feet of the dog and the boy will keep them in place.

The fish pole, which should bend to show the weight of the fish, is made of a thin strip

Fig. 204. Full-size front and right-hand view

Fig. 203. The assembled group

Fig. 207. Full-size pattern of fish

Fig. 205. Full-size rear and left-hand view. See Fig. 206 on page 224

of bamboo. To shape the pole, heat the bamboo over a candle or gas flame and shape it with your fingers. It will bend very easily but care must be taken not to let it catch fire while heating it. The pole is then cemented to the hand, which is whittled to fit the butt of the fish pole. Any white thread can be used for the fish line. Perhaps you would like a larger string of fish but the writer had to quit when he had this one hooked.

This particular group has been left in the white to show it off better. If you should care to paint it, do it with thin transparent water colors. Paint the trousers a light blue to resemble washed out overalls, the shirt yellow, and the hat a straw color. The face, hands, and feet should be a good sun tan color, and the dog may be painted black or brown. Since it is quite difficult to whittle the eyes, they can be drawn in with water color with a few simple lines, or a dot of dark color may be used. The fish may be painted gray and green with a white belly. The base can be painted green, or it may be given a color to represent sand.

VETERANS — ATTENTION

Wider opportunities for veterans, disabled or otherwise, to learn recognized trades and crafts under the amended Servicemen's Readjustment Act (G.I. Bill of Rights) are provided in a new Veterans Administration program.

The program applies to all standard apprentice courses in the building trades, railroad shop crafts and industries in which joint labor-management committees are or may be charged by the states with the responsibility for controlling apprenticeship training.

Authorized in VA Circular 30, dated March 2, 1946, the program results from the VA ruling that all state-approved joint apprenticeship committees or similar labor-management committees now may be recognized as educational or training institutions within the meaning of the law.

The circular explains that liberalized rules under the program permit each joint committee to:

1. Accept applicants for apprenticeship training.
2. Determine the establishment or establishments in which the training is to be provided.
3. Arrange for the placement of each applicant in the chosen establishment; and,
4. Determine that each establishment is providing the prescribed course in accordance with accepted standards and that each applicant is applying himself diligently to the course and is accomplishing its purpose efficiently.

For information write to Veterans Administration, Public Relations Office, Washington, D. C.

WE ARE SORRY

On page 109 of the March, 1946, issue, the position of G. Wesley Ketcham was not correctly given. His position is State Supervisor of Industrial Arts, State Department of Education, Hartford, Conn.

ONE-TUBE A.C. — D.C. RADIO

A. G. BELESON

High School of Science

The Bronx, New York City

This one tube all electric set was designed and built by one of the students, Anthony Oettenger. It is an a.c. — d.c. set and the tube is available at present. The cost of this set is under $4. This little earphone radio set has many uses at home or in the country. Many novel uses and projects can be built with it. For home and hospital use, a bed radio and combination lamp can be built to hang over the bed.

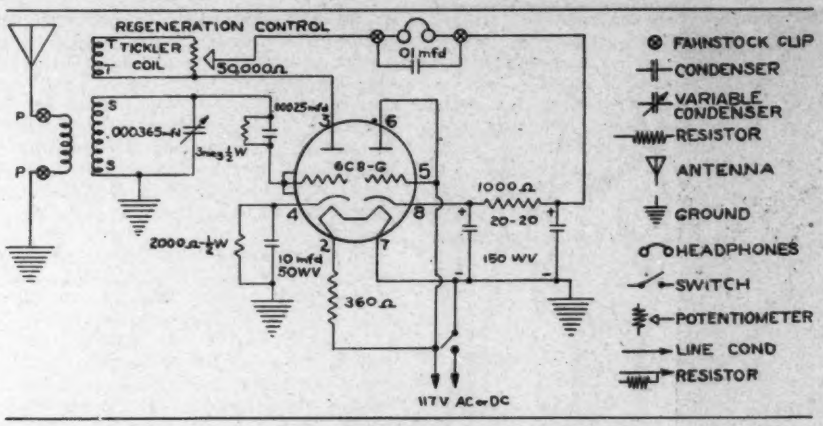
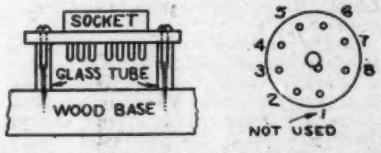


Diagram of a one-tube a.c.-d.c. radio

This is an excellent radio for a beginner to build. It is simple and all parts are available. It is best to build it on a breadboard. The tube used is a twin triode amplifier (6C8-G). This tube except for the common heater, has two triodes independent of each other. The base of this tube fits the standard octal tubing as shown below. The tickler coil (used for regeneration) is made by winding double cotton covered wire (DCC) or enameled wire (E) around the ordinary antenna coil. Eight to ten turns of No. 26 wire is sufficient. Adjust the number of windings for the best reception.



The line cord resistor of this set will become warm during normal use. This cord contains resistance wire to drop the voltage. Do not cut this cord.

In building this radio, check the diagram first, then make the proper connections. Solder each connection as soon as it is made. This will avoid confusion in construction.

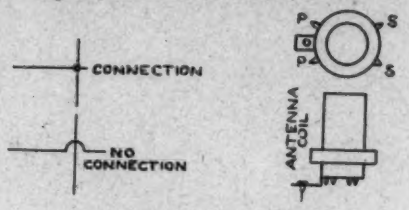
BILL OF MATERIAL

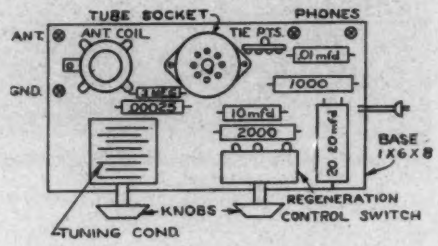
No. required	*Part*	*Size*
1	Antenna coil	Broadcast band
1	Variable condenser	.000365
1	Fixed condenser	.00025 mfd.
1	Resistor	.3 meg. ½ watt
1	Tube	6 C H-G
1	Socket	octal
1	Resistor	2000 ohms, ½ watt
1	Fixed condenser	10 mfd., 50 working volts
1	Line cord resistor	360 ohms
1	Toggle switch	
1	Electrolytic cond.	Dual 20-20 mfd., 150 volts
1	Resistor	1000 ohms, 1 watt
1	Fixed condenser	.01 mfd.
1	Potentiometer	0 to 50,000 ohms
2½ ft.	Tickler coil	No. 26 (enameled)
1 set	Earphones	
1	Antenna	100 ft. long
1	Base	8 x 6 x 1 in.
1	Tie point (mounting lugs)	2 terminals
4	Fahnstock clips	small
6	Roundhead screws	½ in. No. 3
4	Lugs	
2 pcs.	Glass tubing	1 in. long
2	Roundhead screws	1½ in. long, No. 6

Tools Required: Small screw driver, cutting pliers, soldering copper, triangular file, rosin core solder.

To Cut Glass Tube

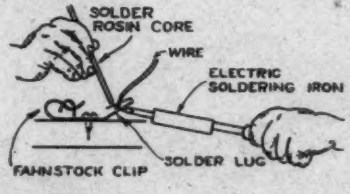
1. Score tube with file.
2. Grasp tube with both hands so that the score lies between both thumbs.
3. Pull tubing, bending at the same time. Tubing will break to the desired size.





Suggestions

1. Use lugs for connections on screws. Do not solder screws.
2. Avoid loose connections. Solder all connections.
3. Keep all the leads as short as possible.
4. Fasten the line cord resistor to the base with an insulated staple. The line cord is not an ordinary extension wire. It contains resistance wire to lower the voltage. Never cut this line cord.



How to Solder

1. Scrape the wire clean.
2. Twist stranded wire together so that there are no single strands.
3. Place wire in the hole of the lug.
4. Heat the joint by holding the hot tinned soldering iron in contact with the joint.
5. Apply solder.

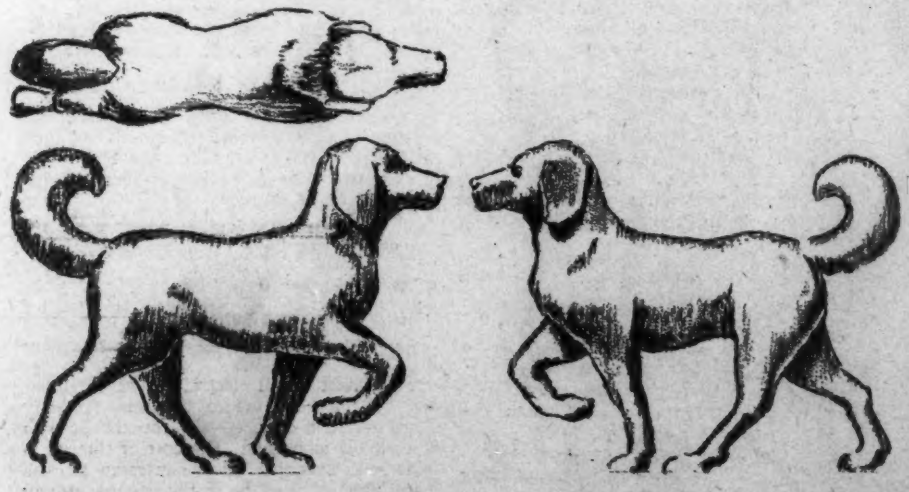


Fig. 206. Full-size pattern of dog. See article and Figs. 203 to 207 on pages 222 and 223

OPERATION SHEET FOR WOODSHOP — KEY RACK

HARRY S. BALDWIN

General Mercer School

Toronto, Ontario, Canada

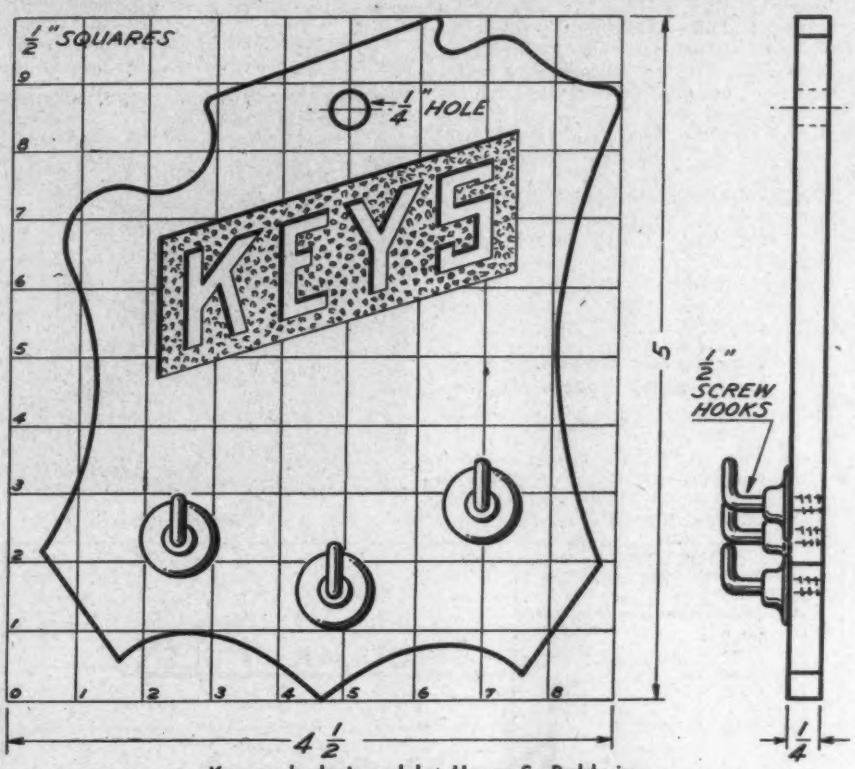
Procedure:

1. On a 4½ by 5½-in. piece of cardboard, mark off ½-in. squares. Transfer the pattern of the key rack from the illustration, square for square. Cut the outline and trace on to a piece of ¼-in. wood.
2. Saw in at intervals around the design with the coping saw. Saw the outline just outside the line, keeping the saw vertical.
3. File all edges and ends with a half-round file; then sandpaper the model. Note the *grain* in the wood.
4. Bore a ¼-in. hole at the top to hang it up.

5. Transfer the word *keys;* cut around the outline and mat down with a matting tool and hammer.

6. Locate the holes for three cup hooks and screw them in. File off the points on the back.

7. Paint the model with tempera or enamel. Trim the edges and the word *keys* with a suitable color.



Key rack designed by Harry S. Baldwin

HOW TO TEACH COPY FITTING BY AN EXACT METHOD

LIEUT. COMDR. R. RANDOLPH KARCH, U.S.N.R.

Why Teach Copy Fitting?

From an industrial-arts standpoint, it is probably more necessary to teach copy fitting than it is to let students set thousands and thousands of ems of straight matter. This is true because the great majority of students will never set type in the working world, but many of them will have occasion to visualize a printed job that they may have to order others to print for them.

Copy fitting is a "must" in vocational printing courses. To omit it is to omit a device that saves untold hours of work done over because it did not fit the first time. This expense, coupled with delay in printing the finished job, is reason enough for teaching copy fitting to vocational printing students. Copy fitting is a necessary unit of learning in any hand- or machine-composition printing course.

Only long experience enables a printer to squint at a piece of copy, and then announce that it will make so many lines of this or that type, set so many picas wide. This is, at best, a "guesstimate," not in any sense an estimate.

Anybody Can Learn How to do Copy Fitting

Anybody can learn to do copy fitting in a day, and after a bit of practice, can count on his estimate hitting the mark — in number of lines — nine times out of ten. The 10 per cent error falls into the reckoning because of the vagaries of individual operator's or hand compositor's spacing between words. In hand composition, the typesetter may prefer to increase space between words, rather than decrease the space to get another word in the line.

In machine composition, the Linotype or Intertype may be equipped with thin spacebands, or medium spacebands, or even thick spacebands. In addition to this, the operator's machine may be so adjusted that the star wheel stops, designating tight line, when the line is *not* tight. The adjustment, if so made, is a safety measure because squirts are prevented when tight lines go down to the mold. One operator may space widely because he likes it that way. Another operator may even omit the space between a period at the end of a sentence and a word beginning with a capital Y or W. There is no end to the speculation as to why spacing varies; but it does for the reasons just mentioned.

In spite of these vagaries, anybody can learn to fit copy to within one line, and hit it on the nose nine times out of ten.

How to Make a Copy-fitting Scale

All one needs to make a copy-fitting scale are: (1) A pica-sized typewriter, or an elite-sized typewriter. (2) Paper. (3) The character count of the type faces in his shop.

If all copy that is composed in the shop is typed on a pica typewriter, only one scale need be made. However, and unfortunately, copy may arrive typed on an elite typewriter. Therefore, it is well to make all scales double, so that they can be used on any type of copy that comes into the shop. See Figure 1.

Steps in Making the Scale

1. Place a piece of paper, preferably bond and white, in the pica typewriter, and type one long, continuous line of figures from 1 to 0, omitting any space. See Figure 1.

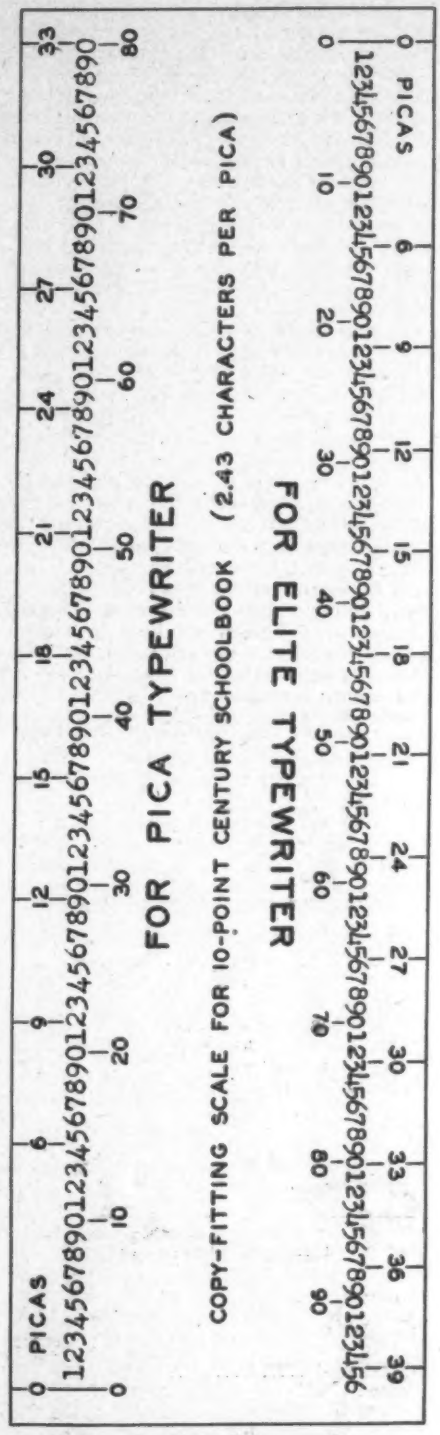


Fig. 1. Copy-fitting scale

The line should be at least 8 in. long. Above each zero character place a figure noting how many characters are contained in the line up to that particular point. For instance, above the first 0, place the figure 10 to show that there are ten spaces up to this point. See Figure 1. Then mark every tenth space as shown.

2. Find out the number of characters per pica in the type face for which you are mak-

ing the scale. The easiest way to do this is to refer to a copy of the *Seventh Production Yearbook,* published by the Colton Press, New York City, which lists the characters per pica of all hand and machine-set type faces. If you cannot find a copy, write to the manufacturer of your type or matrix, and ask what the count is for all of your type.

3. Multiply this figure by 6, to get the characters for an inch, or 6 picas. *Example:* Let us assume that the figure given is 2.43. This means that there are 2.43 characters per pica in this type face, set in lower case. Multiplying 2.43 by 6 equals 14.58, or the number of characters in one inch.

4. Draw a line between figures 14 and 15 on the typewriter scale as shown in Figure 1.

5. Continue this procedure every six picas, or every three picas as was done in the copy-fitting scale illustrated in this article.

6. When finished as far as the scale allows you to go, number each of the lines just drawn, as 6, 12, 18, 24, 30, 36 picas, or in three-pica divisions: 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39 picas.

7. Finally, letter the name of the size and kind of type on the copy-fitting scale.

8. Repeat operations 1 to 7 inclusive, but this time use a typewriter equipped with elite type. Paste the paper with the two scales around a piece of heavy cardboard, and bind the edges with transparent scotch tape.

The scale is then ready for use.

How to Use the Copy-fitting Scale

1. Get all of the copy together.

2. Decide the kind and size of type that is to be used.

3. Determine the width of line, and if it is not on the scale in picas, determine exactly where it is by reference to the other figures on the scale, and make a red mark with pencil.

4. Then scale the copy, measuring along each line, marking a faint colored pencil mark where each line ends.

5. Count the marks when you have completed one paragraph, and write that figure on the margin for future reference when the final layout is made.

6. If one of the colored pencil marks falls in the middle of a word, ignore the fact.

7. Should the copy come out scaled right down to the last word on the copy, loose spacing by the typesetter will probably throw the estimate into an extra line. Keep vagaries in spacing constantly in mind.

TABLE I. Foundry Type Faces Commonly Used in Schools

Figures present characters per pica in lower case.

	8 point	*10 point*	*12 point*
Bernhardt Gothic Medium	3.61	2.94	2.61
Bodoni	3.18	2.63	2.36
Bodoni Bold	2.95	2.50	2.19
Caslon 540	3.39	2.91	2.21
Century Old Style	3.15	2.47	2.23
Century Expanded	2.96	2.45	2.14
Century Schoolbook	2.79	2.43	2.12
Cheltenham Oldstyle	3.85	3.19	2.72
Garamond	3.30	2.90	2.55
Spartan Medium	3.66	2.92	2.50

From TABLE I, it may be noted that certain type faces have a very similar character count. Two have an exact character count. Because of this fact, one copy-fitting scale can serve to fit typewritten copy into more than one type face. Thus, for example, 10-point Bodoni Bold is 2.50; and 12-point Spartan Medium also is 2.50.

Several type faces listed in Table I have a close character count, say within .05 of a character per pica: Bernhardt Gothic Medium, 12 point, 2.61; Bodoni, 10 point, 2.63. A scale for 2.62 characters would be suitable for fitting copy for either with sufficient accuracy.

Century Oldstyle, 8 point, 3.15; Bodoni, 8 point, 3.18; Cheltenham Oldstyle, 10 point, 3.19. A scale for 3.17 would be satisfactory for all three.

Bernhardt Gothic Medium, 10 point, 2.94; Bodoni Bold, 8 point, 2.95; Century Expanded, 8 point, 2.96; Century Schoolbook, 8 point, 2.97. A scale for 2.96 characters would suit all.

Garamond, 10 point, 2.90; Caslon 540, 10 point, 2.91; Spartan Medium, 10 point, 2.92. A scale for 2.91 would be satisfactory for these three.

Century Schoolbook, 10 point, 2.43; Century Expanded, 10 point, 2.45; Century Oldstyle, 10 point, 2.47. A scale for 2.45 would suit these three.

Century Expanded, 12 point, 2.14; Century Schoolbook, 12 point, 2.12. A scale for 2.13 would be sufficiently accurate for either.

See Where a Few Scales Can Apply to All Types in the Shop

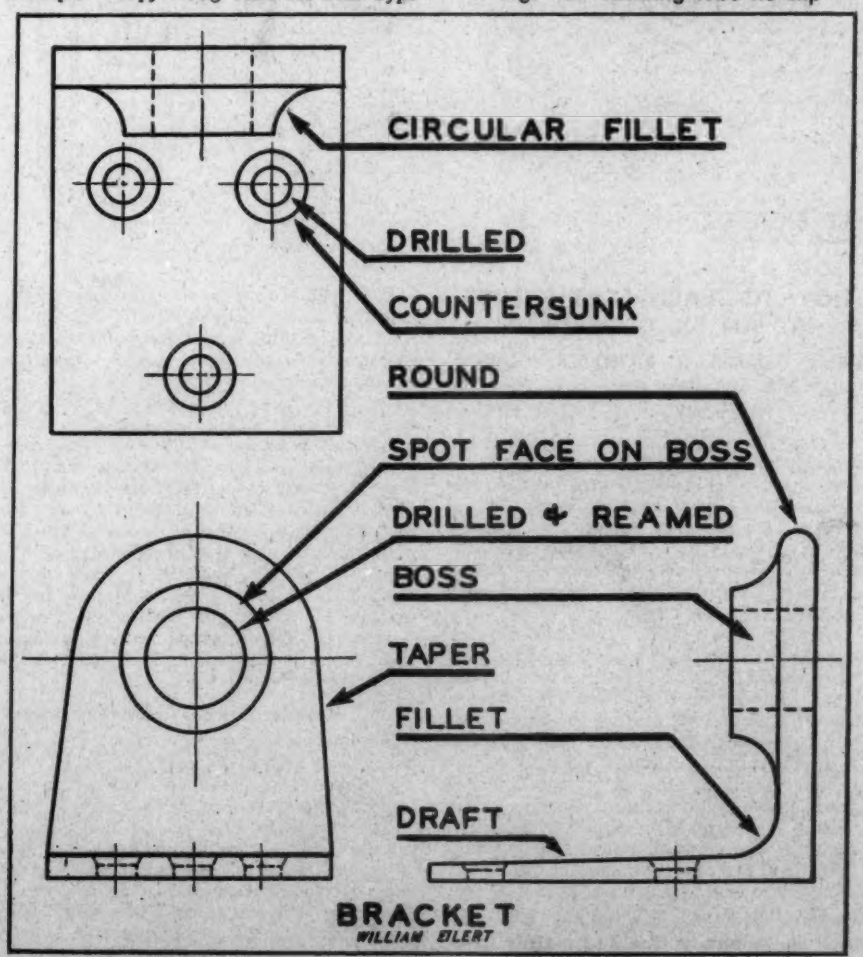
List all body or paragraph type faces in the shop, and at one time get the character count for each. Then examine the figures to find if one scale can apply to more than one of these type faces. List these type faces on the scale. Example: "Copy-fitting Scale for Pica Typewriter, 10-point Bernhardt Gothic Medium; 8-point Bodoni Bold; 8-point Century Expanded; and 8-point Century Schoolbook."

TUBE TIE CLIP

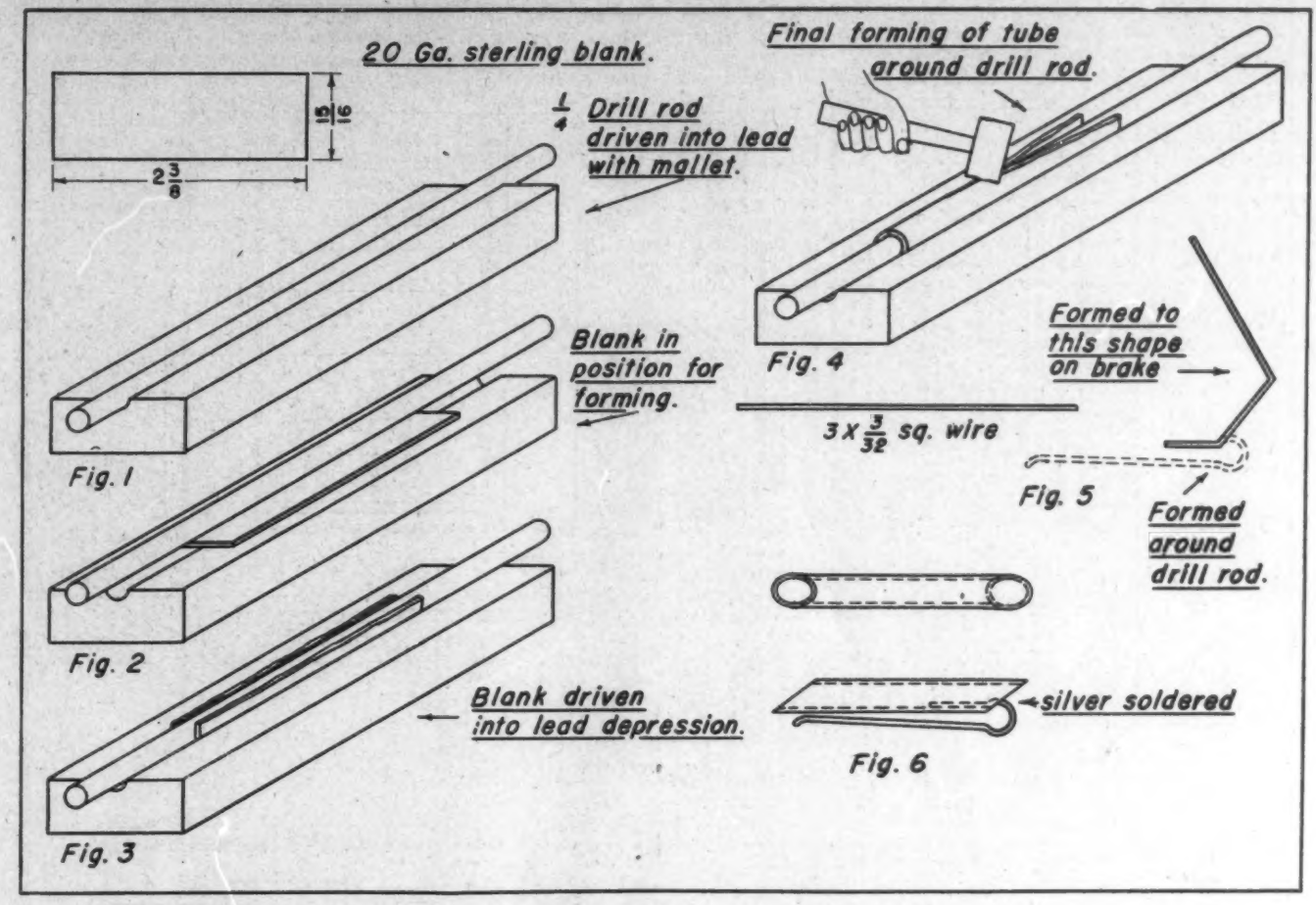
RUFUS JACOBY
Coolidge High School
Washington, D. C.

Tube fabrication, by hand processes, is a fascinating job in industrial-arts general met-

Fig. 4a. Forming tube tie clip



Display drawing of a bracket submitted by R. R. Bedker, High School, Wauwatosa, Wis.



Details of jigs used for forming tube tie clip

alcrafts. The tube tie clasp is an example of the use of tubing in modern jewelry design. Girls may adapt the design to produce a hair barrette or brooch. Sterling silver, which is available to schools for educational purposes, is recommended. Students feel that the finished product in "sterling" is so much more valuable than the copper or brass product, that they prefer to pay approximately forty cents for the silver.

The related informational content of this job may include industrial methods of fabricating seamed and seamless tubing.

Dimensions of the clasp are omitted in the accompanying illustration to give the pupil an opportunity to develop his own size and proportions. Students should be cautioned to add 1/16 in. to the circumference of the drill rod over which the tube is formed, to get the width of the blank. This permits easy removal of the tube from the rod over which it was formed. The lead base is made by pouring molten lead into a box made of cardboard or wood. The side of the blank which will be the inside of the tube must be sanded and buffed before the tube is formed. To solder the joint, place the silver solder snips along the joint inside the tube; heat the tube along the joint to the melting point of the solder, and the solder will flow into the joint. When soldering sterling silver, care must be taken not to overheat or *burn* the metal. Burned silver has dark blotches which are quite noticeable when the metal is polished.

Plan of Procedure:

1. Sketch the design.
2. Make a bill of material.
3. Calculate the cost.
4. Outline the plan of procedure.
5. Get the instructor's approval of steps 1, 2, 3, and 4.
6. Get out the stock.
7. Make the lead base.
8. Make the groove in the lead base. See Figure 1.
9. Smooth inside surface of the blank with abrasive paper, steel wool, and buffer.
10. Center blank over groove, as shown in Figure 2.
11. Drive the blank into the groove by pounding on the drill rod with a mallet. See Figure 3.
12. Complete the forming of the blank around the drill rod, as shown in Figures 4 and 4a. The edges must be tight and flush.
13. Solder the joint.
14. Smooth the outside of the tube with scotch stone.
15. Finish outside of tube on hard felt buff with crocus abrasive.
16. Lay out 60-deg. bevels.
17. Saw beveled ends with jeweler's saw.
18. File and *stone* ends.
19. Form 3/32-in. square wire clip to shape, as shown in Figure 5.
20. Solder clip in place. See Figure 6.
21. Buff entire job with abrasive on cloth buff.
22. Polish with rouge on flannel buff.
23. Wash in hot soapy ammonia water.
24. Check and evaluate the completed job.

OPEN POTTERY KILN

B. BARRY GORDON

New Jersey School System

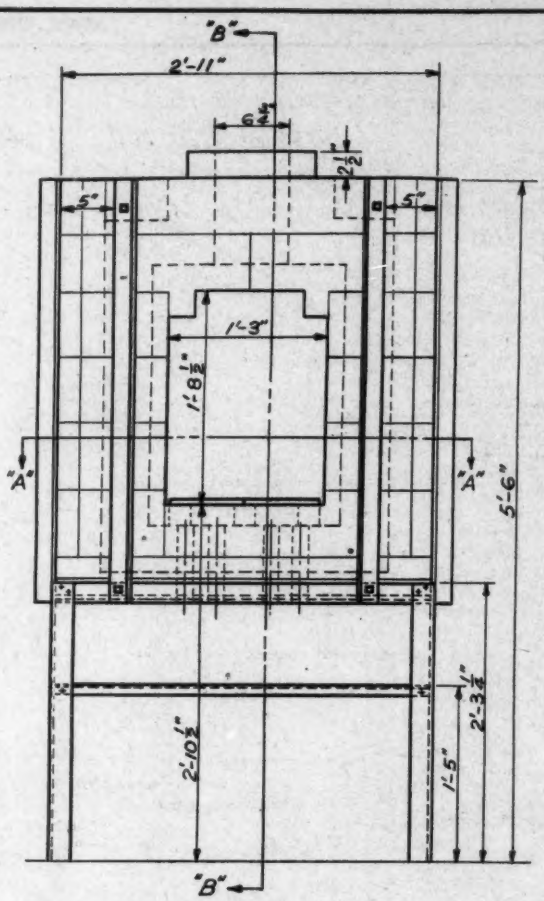
Trenton, N. J.

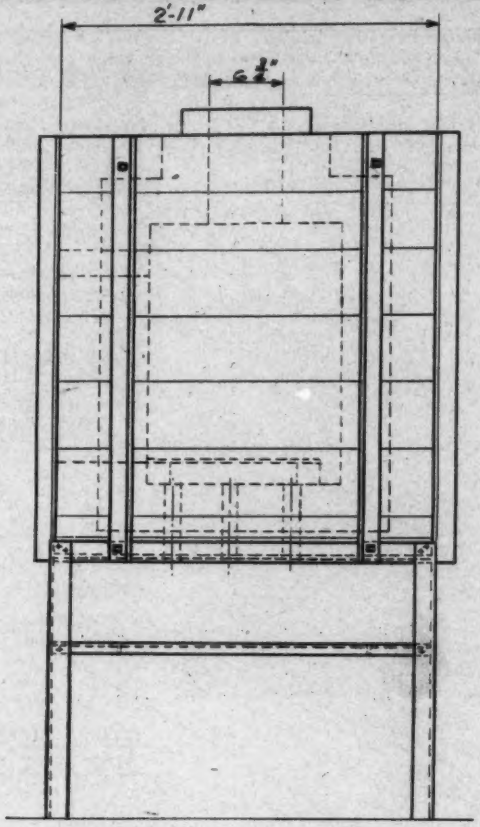
Sometime ago I became interested in an open kiln used in the ceramics shop of New York University and built by the instructor, Miss Ruth Canfield. Since there were no drawings of this particular kiln available, I secured the permission of Professor Ray E. Haines, director of instructional shops, to measure the existing kiln, and drew up a set of detailed working drawings.

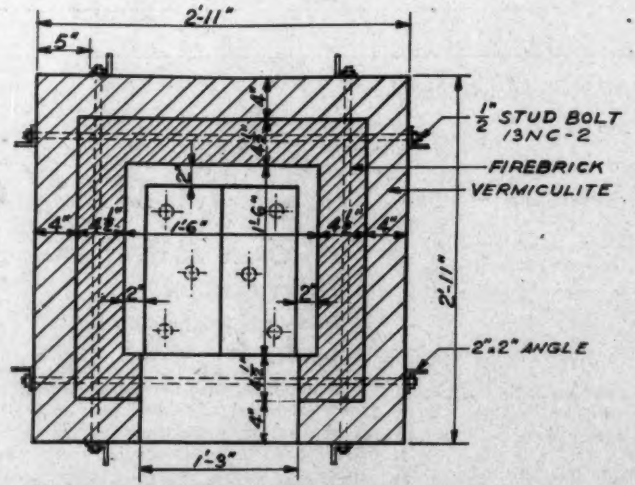
Kilns of this type can be constructed by the industrial-arts instructor, and the size may vary to meet the needs of a general or a unit ceramics shop.

An open kiln is an insulated boxlike structure into which pottery may be stacked for firing. The inner construction must be able to take repeated firings without losing its efficiency. The refractory material for these walls is firebrick. Cements should never be used, because under constant firings there is contraction and expansion which may result in pieces of cement falling into the ware.

Bunsen burners may be utilized with the



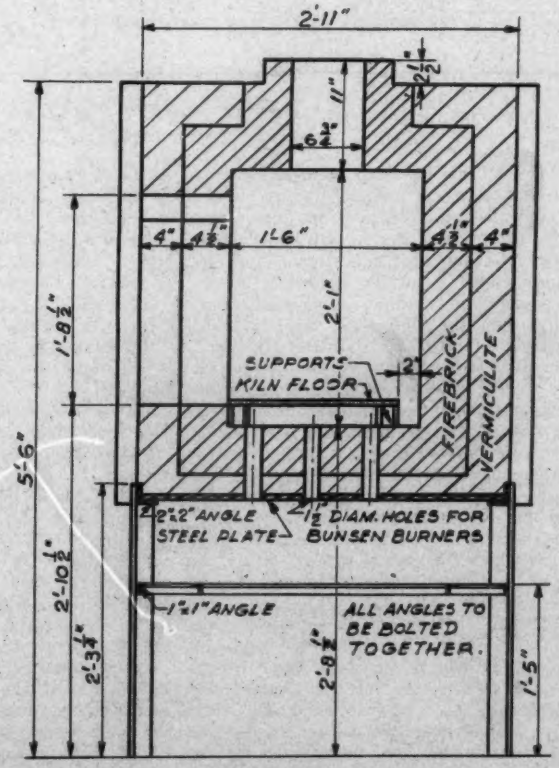




BRICK UP OPENING BEFORE FIRING. HAVE INNER FACE SMOOTH. PLUG UP ALL SMALL OPENINGS, EXCEPT SPY HOLE, WITH TERRA COTTA CLAY.

SECTION "A-A"

NOTE:- THESE DIMENSIONS MAY VARY SLIGHTLY DUE TO DIFFERENCES IN THE SIZES OF THE MATERIALS.



SECTION "B-B"

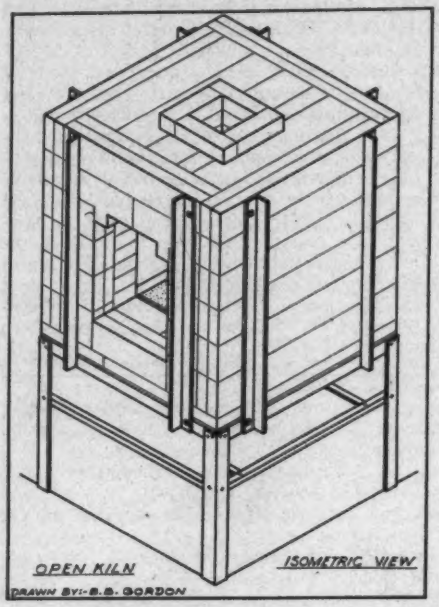
OPEN KILN

Details of open pottery kiln

open kiln with good results. These burners provide excellent combustion and intense heat. Oxygen must be supplied in ample quantities. The top of the kiln has an opening in the center and is bricked up as though for a chimney. When firing, place refractory bricks over the top surface. If these bricks lie close together, little oxygen is available to the flame. On the other hand, there is a temperature loss if the bricks lie too far apart. One way of estimating the width of the opening is not to allow the tip of the flame to show above the top of the kiln.

One must arrange ware according to height and shape so that the entire kiln, from floor to ceiling, is filled with pieces to prevent air pockets. Kiln shelves and shelf supports can be adjusted to meet this need.

Every kiln performs in an individual manner, and its behavior can only be ascertained through use. The kiln should be built in an area where no strong drafts will strike it, and yet an abundance of clean air must be available.



PRINTING, A HEALTHFUL OCCUPATION

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San Jose, Calif.

In the eighteenth and nineteenth centuries printing gained, and richly merited, the reputation of being a most unhealthful occupation. This industry was conducted in outhouses, in damp cellars, and in other insanitary quarters. Inadequate ventilation, poor illumination from open gas jets whose fumes added to the general pollution, of the air as well as a complete lack of heating equipment, were common conditions in the workshops. The workers, usually unmarried males, were a migratory class, and were largely addicted to excessive drinking. As a result of these conditions, mortality was very high.

Within the past half century, however, the situation has been reversed, and printing today is one of the most healthful of all occupations. To some extent this change has been aided by labor unions, but the principal factor has been improvements in equipment, in lighting, and in sanitary measures generally. It no longer is profitable to permit poor working conditions.

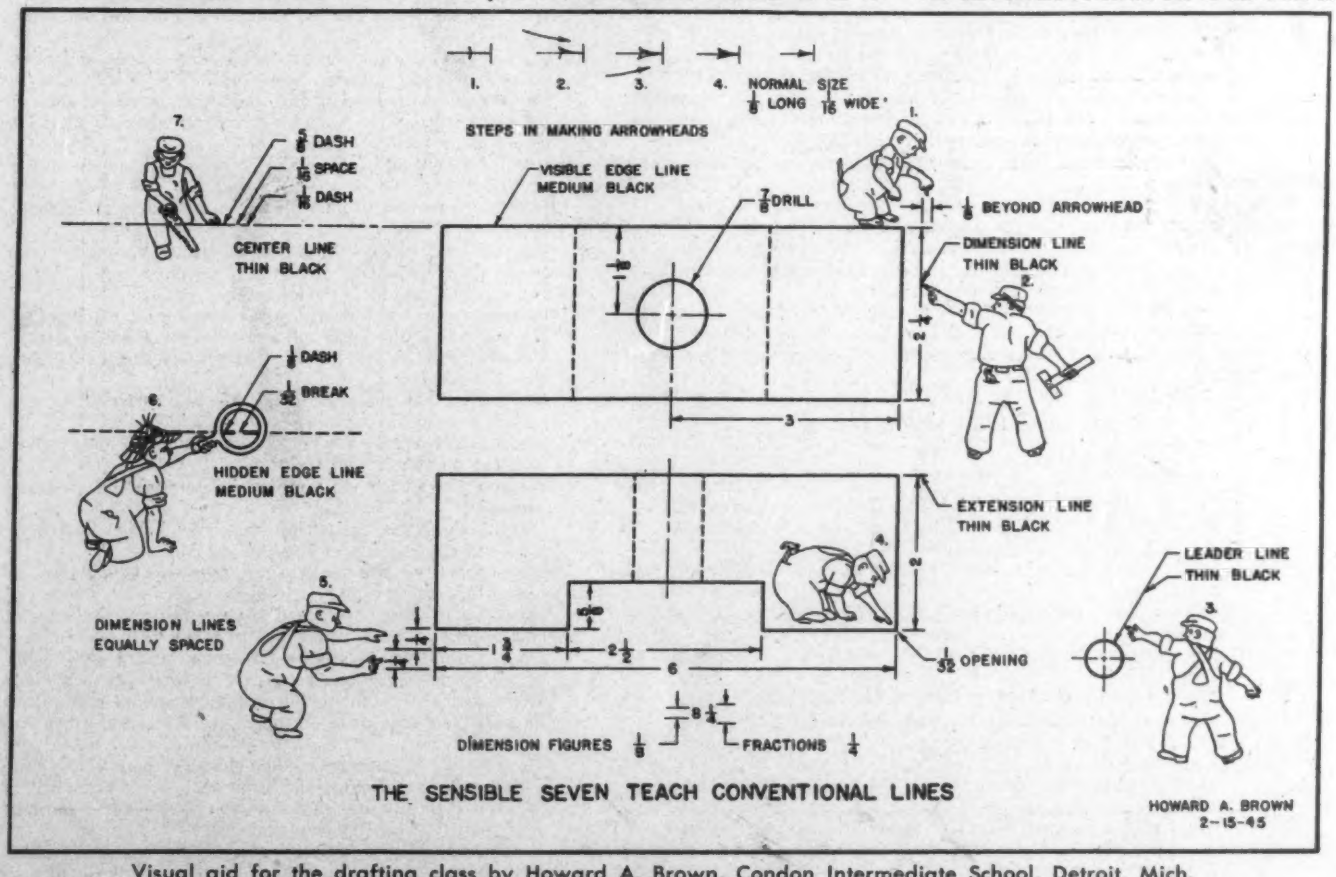
Today's printers and other craftsmen are as a class healthy and productive members of society. They are home owners, the heads of families; they are well educated, well dressed, and sober; they are known as steady-going members of the communities in which they work and live. Women, also, find employment as hand compositors, composing machine operators, and in bindery work.

Almost without exception, working quarters, even in small towns where there is no organized supervision, are clean, adequately lighted, well heated and ventilated, and are provided with every modern sanitary convenience. Noxious fumes or dampness are unknown. As a result, statistics show the death rate for printing craftsmen to be lower than that for the population as a whole.

School premises used for teaching printing should be worthy examples of the new industrial conditions. Health integrations as taught in printing classes should pertain especially to those general conditions which promote working efficiency. Some of these are:

1. *Clean workshops.* A school print shop should be kept clean. Numerous receptacles should be provided for wastepaper, and no paper should be thrown on the floor. Covered metal containers for oily rags should be placed near imposing stones, and near proof presses and other presses.

Windows should be washed frequently, and floors should be scrubbed or reoiled monthly. The dust should be blown out of the cases at



Visual aid for the drafting class by Howard A. Brown, Condon Intermediate School, Detroit, Mich.

the beginning of each school term. This operation should be performed out of doors if an old fashioned bellows is used. Many shops, however, are using vacuum cleaners with special attachments for case cleaning.

All working surfaces should be kept free from ink and dust at all times. Presses and other machines should be wiped off every day, to remove dust and surplus oil. All metal chips and waste metal should be removed from around composing machines and type saws at least once a day.

2. *Proper lighting, heating, and ventilating of working quarters.* Here the emphasis is upon proper use of facilities. Many individuals neglect or abuse equipment provided for their comfort. It is not an uncomon experience to find a shop with the windows closed and the steam heat turned on full blast. Lighting sources in dozens of cases are reduced to a fraction of their true efficiency by grime and dust. Students should be instructed to watch at all times these three sources of health and comfort: Light, heat, and fresh air.

3. *Cleanliness of body and of wearing apparel.* Workers in modern plants present visible proof that printing is a "clean" trade. Inky "printer's devils" are as extinct as celluloid collars. After a day's work the modern printer washes his hands, rolls down his sleeves, and turns his steps homeward with the rest of the "white collar workers." To protect his clothing, he wears in the shop an apron, or smock, or pressman's coverall. Such garments are laundered weekly and usually are immaculate.

Just so, students should be taught methods that prevent their getting hands, faces, and clothing daubed with ink or dirt. Inks should be kept where they belong — in the cans or tubes, in the press fountains, or on ink plates or rollers.

A skillful pressworker, after cleaning the ink from a large press, will show few ink stains on his hands. This requires skill, however. Students will find it possible, though, to grasp wash rags in ways that keep most of the wash oil and dissolved inks on the cloths.

Adequate wash-up sinks should be provided and should be kept spotless. Sand soap, soap powders, or other detergents should have proper receptacles to prevent waste.

4. Foremost among the desirable personal habits may be placed regular and proper diet. All shopwork combines mental and manual labor, and under such circumstances the human machine consumes more fuel.

5. Enough sleep is another commonsensical factor in efficiency.

6. Habitual use of alcoholic liquors, and excessive smoking that becomes a vicious habit, have no place in any industry. Practically all printing establishments nowadays have a "No Smoking" rule; almost all plants consider a habitual drinker unemployable, if for no other reason than the fact that the safety of others is jeopardized by the man who is unsure of himself because of alcoholic excesses.

Students must realize that modern industry demands responsible workers, and that any uncontrolled bad habit is a serious handicap.

7. *Proper exercise.* While developing manual skills and proper working habits and attitudes, the printing instructor has an admirable opportunity to develop health habits, one of which is regular exercise. The habit of exercise once acquired, will help to maintain the individual's efficiency throughout his active life. Printers need to develop this habit, since their occupation is, to a large extent, a sedentary one, or at least one that is carried on indoors.

SELF-EVALUATING WORK HABITS AND CHARACTER TESTS FOR PRINT-SHOP STUDENTS

B. H. THOMAS

Central High School

Oklahoma City, Okla.

Industrial employers desire their apprentices to possess good characters, as well as to be profitable employees from the first day of employment.

Development of these characteristics in the learners during school is a "must." The result of teachers' efforts to do this ranges all the way from good to bad. Some teachers rely solely on constant repetition; example in teaching printing — telling the learners to compare type faces before distributing, put away your tools, check your figures, read your own proof, judge the results yourself, determine points for improvement, and hundreds of other items day after day to the same 100 or more learners.

Much of this constant repetition is unnecessary when various kinds of self-evaluation tests on the development of character and work habits are periodically used. The tests are more effective when they follow a serious discussion centering on the qualifications of learners who are most likely to be employed, and to hold the job.

Here are two tests of this character which may be found helpful to printing teachers. Most of the material is original, while some was taken from magazines and books and adapted to the needs of our training plant:

Self-Evaluating Work Habits Test

Name..... Date.....

Yes No

1. .. .. Do you check face, size, nick before distributing dead type?
2. .. .. Do you make corrections on the stone and then put material back in cases immediately?
3. .. .. Do you lock form just tight enough to hold, so it won't buckle?
4. .. .. Do you start make-ready with little packing then work the impression up a little at a time?
5. .. .. Do you position the print on the sheet before starting make-ready?
6. .. .. Do you secure an O.K. on every job before running it?
7. .. .. Do you *always* furnish copy with proof for O.K.?
8. .. .. Do you run press slow enough to hit the guides and make each sheet stick?
9. .. .. Do you follow through on your job without being told where you left off?
10. .. .. Do you cut padding boards at the same time you cut the stock?
11. .. .. Do you check your figures when figuring stock?
12. .. .. Do you place cut edges of stock together when cutting?
13. .. .. Do you check cutter gauge before each cut to see whether it has been moved?
14. .. .. Do you know what the handbook says about the charges per sheet for Bristol?
15. .. .. Do you know how to make all stock for a ticket job the same size?
16. .. .. Do you protect labels on packages of stock?
17. .. .. Do you put stock back after moving it?
18. .. .. Can you identify book, cover, bond, and bristol stock?
19. .. .. Do you band waste and put it in stock room without being told?
20. .. .. Do you pick up equipment from the floor, stones, and cases and put it away without being told?
21. .. .. Do you select the hardest jobs to do when there is a choice?
22. .. .. Do you analyze a job to find out yourself what it's all about before going to the foreman?
23. .. .. Do you fill out all blanks with necessary information on job envelopes?
24. .. .. Do you know how to find out where type faces are without asking?
25. .. .. Do you save ink by putting on a little and working it up to the right amount?
26. .. .. Do you put rags in can after using?
27. .. .. Do you report any unusual noise or action of machines?
28. .. .. Do you adjust the press rollers for height when necessary?
29. .. .. Do you clean guides before setting them in the tympan sheet?
30. .. .. Do you replace tools after using — pliers, screw drivers, knives, wrenches?
31. .. .. Do you feel you are responsible for helping others get their jobs out on time?
32. .. .. Do you judge each job you do to determine the good and bad points?
33. .. .. Do you think the results (information and skill) justify the time and study you spend in this course?
34. .. .. Do you believe you really learn to think any better, by taking this course?
35. .. .. Have you set up any standard of your own to judge amount and quality of work you desire to attain?
36. .. .. Do you think you should be graded on amount and quality of work you have done compared to what you *could* do?
37. .. .. Do you think you should be graded on amount and quality of work you have done compared to what some other student has done?
38. .. .. Do you like to have jobs which challenge your ability, and which require real effort and study?
39. .. .. Do you earnestly and sincerely try to turn out a job that is a credit to you and your plant?
40. .. .. What grade do you think you are making, based on willingness, promptness, co-operation, honesty, effort, quality of

work, information acquired, skill achieved, ability to analyze, *ability to think?*

Self-Evaluating Character Test

The following is a list of attitudes and habits which will contribute to my success in life. Only I can develop them, and I should conscientiously practice them until they become fixed habits.

	Very poor	*Poor*	*Fair*	*Good*	*Excellent*
1. *Industry.* This means a habit of careful, thoughtful work, without loitering or wasting time.	. .	. .	. .	. .	. .
2. *Co-operation.* This means an attitude of readiness to assist others when they need help, and to join in group undertakings and group responsibilities.	. .	. .	. .	. .	. .
3. *Consideration of others.* This means a thoughtful attitude in the matter of making things easy and pleasant for others, such as keeping things in order, putting tools and materials away in good condition, and always doing your full share of work where others are involved.	. .	. .	. .	. .	. .
4. *Self-reliance.* This attitude is a very important factor in success. It means the development of the habit of planning tasks carefully and thoughtfully, and carrying them out with the least possible assistance. Only when the problem is too difficult for the worker should he call for help.	. .	. .	. .	. .	. .
5. *Readiness to assume responsibility.* This means that the worker should not refuse to undertake a task because it is difficult, and when once undertaken, he should carry it through to completion on time.	. .	. .	. .	. .	. .
6. *Promptness.* This means that the worker should report for and begin work on time. If the job is an emergency one or rush job, then he should stick with it after quitting time.	. .	. .	. .	. .	. .

Suppose you were asked to inspect yourself? Would you pass your own inspection? Or would you want to replace a few "defective" habits? *"Check" your faults.*

Negligent	Wasteful	Selfish	Discontented	Rebellious
Discourteous	Lazy	Loafer	Irresponsible	Indifferent

CIVIL WAR MORTAR

GEORGE F. LARTZ
High School
Frederick, Md.

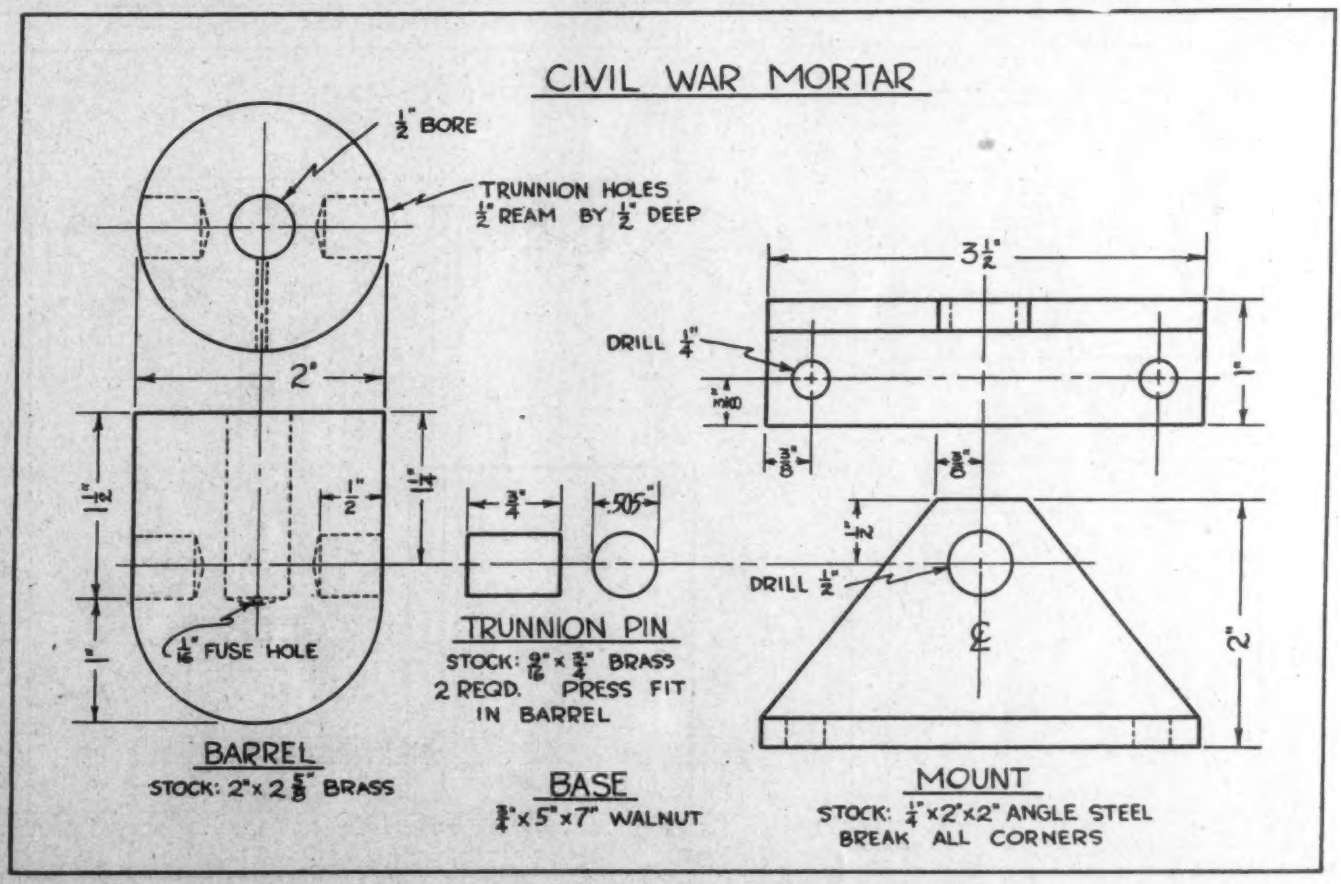
This unusual gun of Civil War time makes an interesting scale model machine-shop job. The originals were set up to shell Yorktown which was defended by Confederate troops while the defenses of Richmond were being strengthened. Behind these tremendous guns the Federals felt safe. Made of brass and mounted on ¼-in. angle steel with a walnut base, this project lends an added appeal to the machine-shop classes. Not very hard to turn, this mortar is a live job in that it can be made to fire ½-in. ball bearings from any old discarded ball bearing. The gun illustrated herewith was made by a high school boy, and the following general steps were used:

Machining Trunnions

1. Mount short brass stock in chuck or collet
2. Turn to dimensions, polish, cut off
3. Reverse stock, face, polish
4. Set aside to press in barrel later

Machining Mortar Barrel

1. Get out brass stock
2. Mount in independent chuck; use dial test indicator
3. Face end
4. Center drill, bore with 31/64-in. drill, and ream ½ in. to depth
5. Reverse in chuck; line up again with dial test indicator
6. Turn rounded end of mortar; use 1-in. radius gauge for guide
7. With V block and surface gauge, lay out trunnion and fuse holes
8. Carefully mount in drill press vise, drill, and ream trunnion holes
9. Drill fuse hole
10. Polish over-all



Details of Civil War mortar

11. Press trunnion pins in place

Machining Mortar Mounts

1. Cut two lengths angle steel from bar
2. Lay out to dimensions and rough cut
3. File to dimensions
4. Lay out, center punch, and drill all holes to size
5. Clean off burrs, and break all corners
6. Paint with flat black

Making Walnut Base (Woodworking Dept.)

1. Cut stock to size — ¾ by 5 by 7 in.
2. Cut chamfers
3. Lay out and drill spots for three ½-in. balls
4. Lay out and drill 7/32-in. holes for fastening mount
5. Sand smooth, stain, shellac, and polish
6. Cut strip of 20-gauge brass ½ by 3 in., and stamp *Civil War Mortar* on it. Polish, and fasten to base with escutcheon pins

Assembly

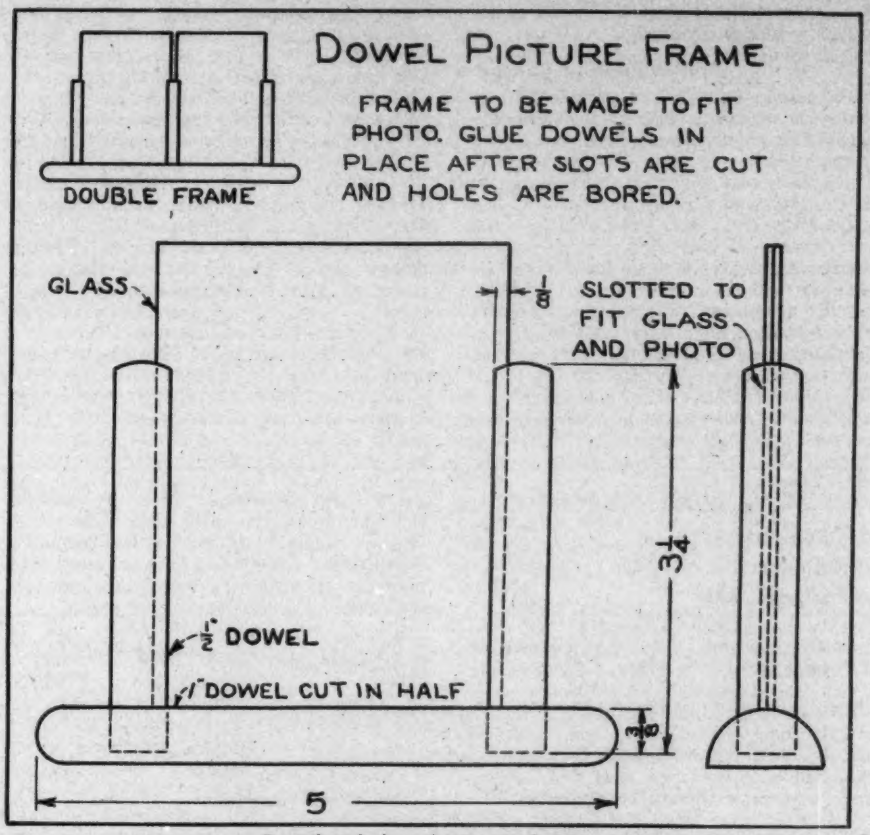
1. Assemble mortar and mounts
2. Fasten to base with four ¼ by 1-in. lag screws
3. Pile four ½-in. balls in place
4. Turn in for grading

DOWEL PICTURE FRAMES — SINGLE AND DOUBLE

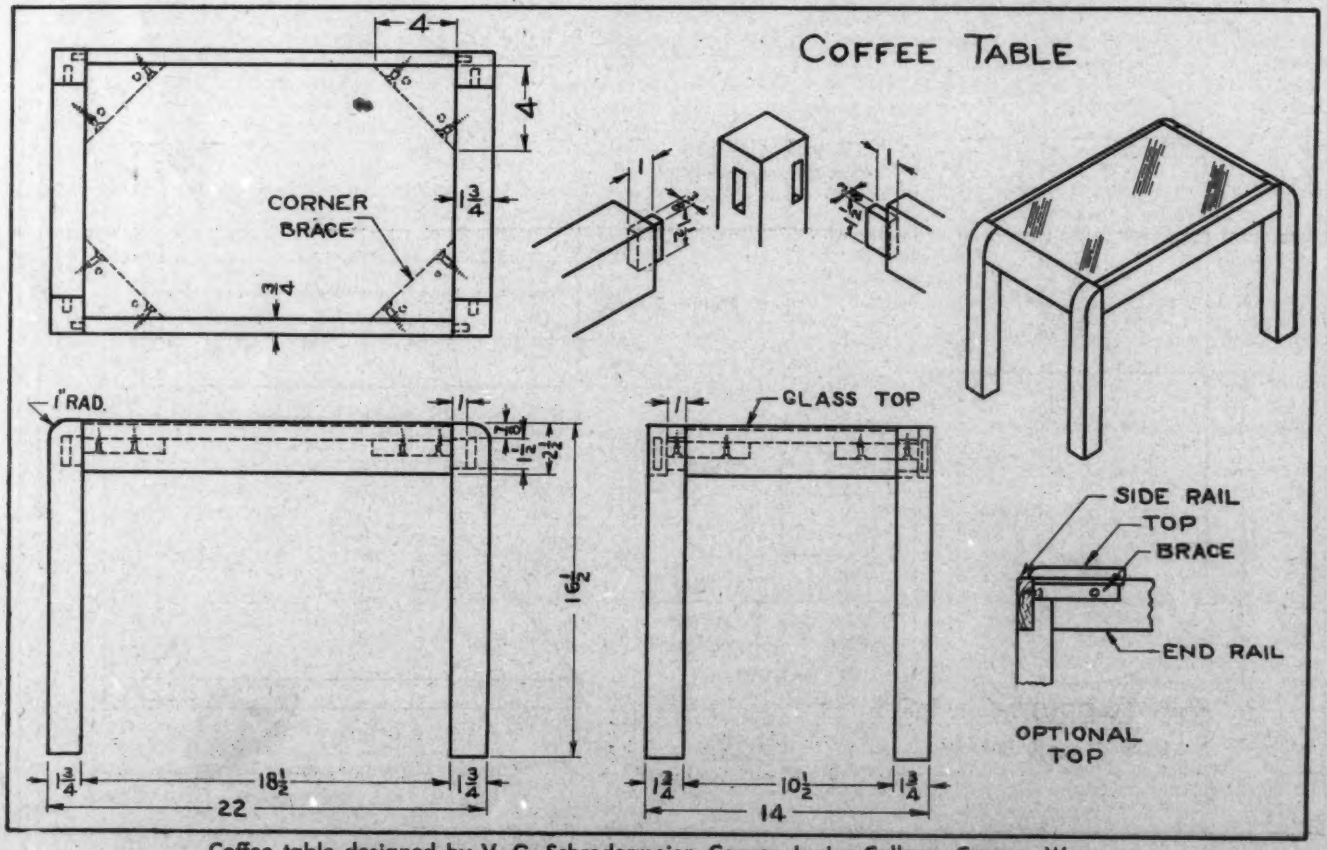
ISADORE M. FENN

Chicago Vocational School
Chicago, Ill.

Picture frames are always welcome. This dowel picture frame, single or double, can be made during one shop period. It is a very fine supplementary project.



Details of dowel picture frame



Coffee table designed by V. G. Schrodermeier, Casper Junior College, Casper, Wyo.

Each student should be instructed to decide upon the particular picture or pictures he is going to frame before he begins construction, in order that he will be better able to determine the proper size frame that he needs.

Three dowel rods are required for the single frame and four dowels for the double. For the single frame mark the end dowels and cut out the slots to fit the two plates of glass. Bore two holes in the dowel base. Sandpaper the three dowels. Assemble and finish. Place the photograph in between the two plates of glass and insert the glass into the frame. The double picture frame may be made in the same manner. Glass for the frames may be salvaged from some of the broken pieces which the school engineer usually has in the storeroom.

MODERNISTIC FLUORESCENT DESK LAMP

HAROLD M. GRAY

Sumner High School

St. Louis, Mo.

The desk lamp shown in the accompanying illustration is easily constructed at a very reasonable cost.

The base is routed on the drill press to hold pens and pencils. It is drilled at each end to hold paper clips, rubber bands, or ink.

The metal top is fastened to the shade sides with escutcheon pins or roundhead nails.

The lamp is finished with clear shellac and wax.

Materials necessary for construction are:

No. of Pieces	*Part*	*Material*	*Size*
1	Base	Walnut	1½ x 5 x 12
3	Uprights	Dowelrods	½ dia. x 12
1	Back	Walnut	1⅛ x 1⅛ x 15
2	Shade sides	Walnut	½ x 3 x 6
1	Top	Bright tin	10 x 15
1 set	Fixtures	Fluorescent	14 in. long

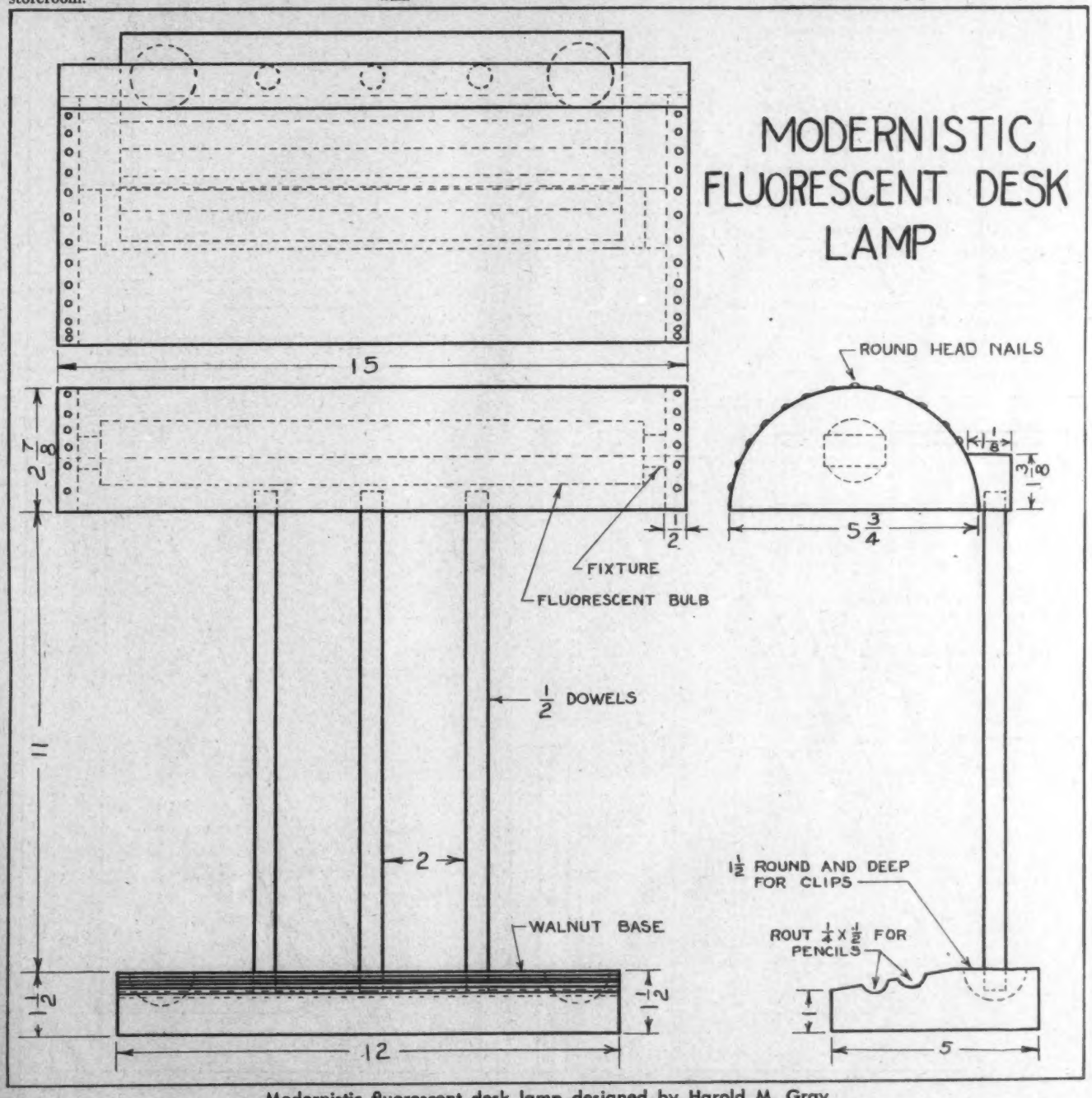
PLANER GAUGE

ROBERT L. MOHLE

Hyattsville, Md.

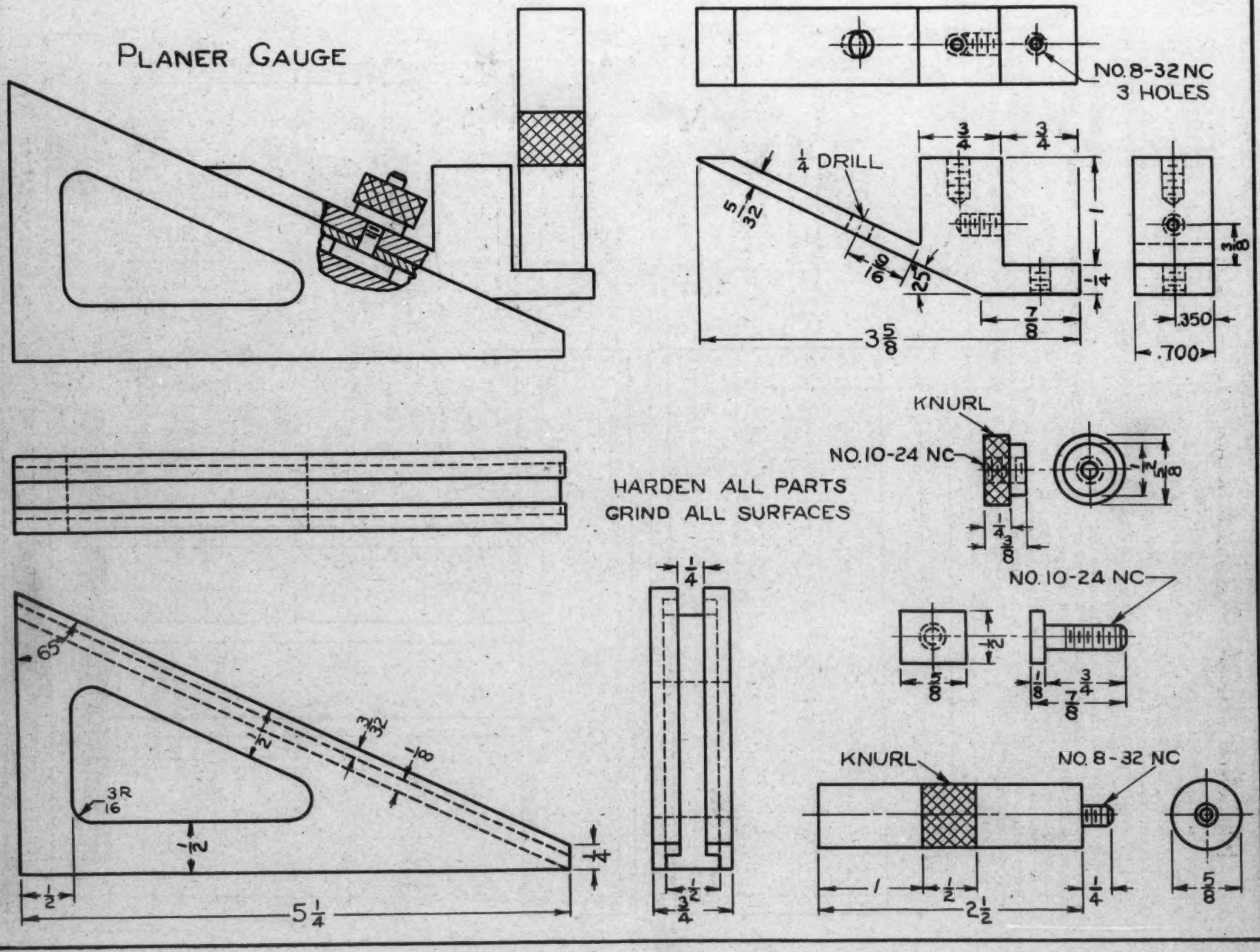
The planer gauge is a very useful tool for setting tools on planers and shapers, and it also may be used as an adjustable space block.

(Continued on pages 234 and 22A)



Modernistic fluorescent desk lamp designed by Harold M. Gray

PLANER GAUGE



Planer gauge designed by Robert L. Mohle

Modern vocational schools teach

COLOR DYNAMICS*

to their students!

Planer gauge designed by Robert L. Mohle

* Pittsburgh's system of using the *energy in color* retards eye fatigue among employees, improves working conditions, promotes health, safety and morale—maintains quality and quantity of production at high levels.

MANY TEACHERS of the vocational and manual sciences are now including Pittsburgh's COLOR DYNAMICS in their courses. They recognize that greater knowledge and more widespread use of this new system of painting are making a great contribution to the improvement of production and the welfare of workers.

Authorities on human behavior have established beyond dispute the fact that color has a marked influence upon the physical, mental and nervous systems of normal human beings. Shopmen in many plants are finding that color properly "engineered" on machines, walls, floors and ceilings of their plants actually produces *more work per man-hour and more man-hours per man!*

By the use of focal and eye-rest colors, operating parts of the machine are separated from stationary parts and the materials being fabricated. The worker is able to see his job better. Eye fatigue, so often the cause of lowered efficiency, is lessened. Morale-building colors improve the worker's mental attitude toward his job. Safety colors warn him of danger areas and reduce accident hazards.

• • •

● If you want your students to be equipped thoroughly for their future tasks, begin teaching COLOR DYNAMICS as part of your regular school course. You can demonstrate its benefits in your own manual training classes by painting machines, walls, floors and ceilings of your classrooms.

Write today for a free copy of our book, "*Color Dynamics*". Packed with useful information and practical suggestions, it makes a fine textbook. Address Pittsburgh Plate Glass Company, Paint Division, Dept. IV-5, Pittsburgh 22, Pennsylvania.

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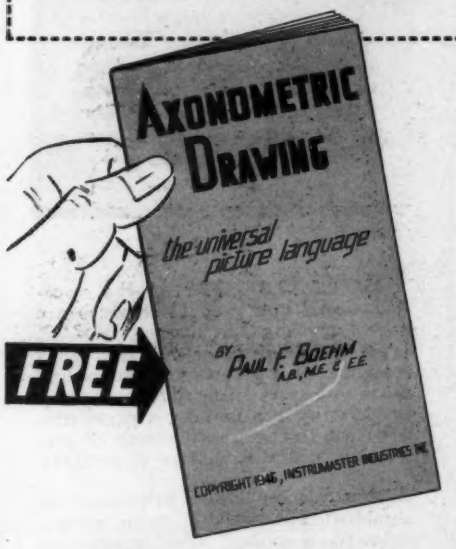

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(Continued from page 233)

It can be set for any size from ¼ in. and up by adjusting the two sliding parts and using the extension and setting the size with a micrometer. As many extensions as needed can be made up.

The entire tool should be made of tool steel and hardened. In cutting the center portion out of the base the three radii can be gotten by drilling three holes and then cutting the straight sides with a saw, or this can be milled out with an end mill. The base and slide are milled to size leaving .010 or .015 in. oversize for grinding. The holes are then drilled and tapped and the parts hardened. The screw and nut are turned to size and hardened; these do not need to be ground. The extension needs grinding to length only. If more than one extension is made it should have a tapped hole in the plain end so that the two extensions can be screwed together when needed.

This job requires accuracy in machining so that it will be a precision tool when finished.

Personal News

ARTHUR F. HOPPER NAMED SUPERINTENDENT

Arthur F. Hopper, who has served as acting superintendent of schools at Plainfield, N. J., since June, 1944, has now been appointed superintendent of that system.

Mr. Hopper earned his B.S. and M.A. degree at Teachers College, Columbia University. He has also completed some of his doctoral work at that institution.

He was appointed director of industrial and fine arts at Plainfield in 1915. In 1920 he was made principal of the Continuation School, director of educational guidance in 1926, and

Arthur F. Hopper

principal of the Plainfield Evening School in 1928.

Besides his work at Plainfield, Mr. Hopper has been associated with the extension division of Rutgers University for more than 20 years, teaching courses in psychology, sociology, administration, and supervision. He has also been director of industrial-arts teacher training at the university's summer session.

In 1923 Mr. Hopper made a European trip, making a study of industrial, technical, and fine arts education in France, England, Switzerland, and Germany. In 1933 he made another tour of these countries to study their academic offerings.

He has been active, and held office in many professional associations and has appeared frequently on the programs of state and national educational organizations.

He also has done considerable writing for professional publications.

♦ C. L. GREIBER, state director of vocational and adult education of Wisconsin, and president of the American Vocational Association, was guest of honor at a dinner given by the state office staff and guests at Madison, Wis.

John Tepoortan acted as toastmaster. W. F. Faulkes, chief of the rehabilitation division, R. L. Welch, state supervisor of trade and industrial education, and L. M. Sasman, state supervisor of agricultural education, spoke in behalf of the co-workers in their respective divisions and extended congratulations to the honored guest.

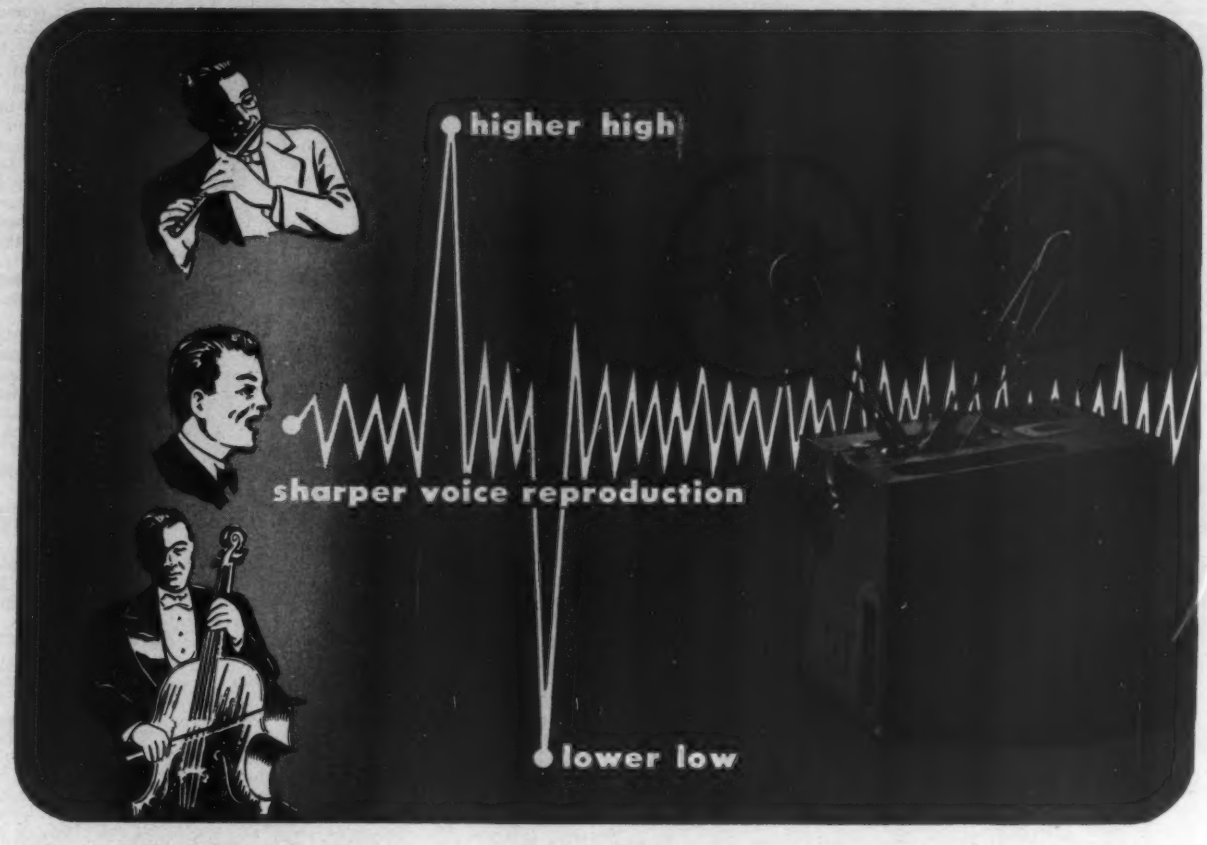
♦ C. E. HIGHLEN has resigned as assistant to the executive secretary of the American Vocational Association, L. H. Dennis, to accept a position as principal of vocational schools, Atlantic City, N. J. Before joining the A.V.A. staff, Mr. Highlen was with the Navy V-12 program and left the service with the rank of lieutenant commander. Previously he had been an instructor and co-ordinator of apprentice training for the Muskegon, Mich., public schools, and supervisor of trade and industrial education, Michigan State Board of Control for Vocational Education, during the early months of the national defense training program. He also had served with the navy during World War I. Mr. Highlen assumes his new position May 1.

♦ RALPH O. GALLINGTON, former assistant professor of industrial education, University of Maryland, has been appointed associate, mechanical engineering department, School of Engineering, George Washington University, Washington, D. C.

He was recently engaged as a production design engineer and was responsible for the development of special synthetic devices used in the training of fighter pilots for the armed forces. He also assisted in the preparation and illustration of many training manuals which were used as guides in this type of instruction.

He was graduated from the Indiana State

(Continued on page 24A)



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12 Spindle Speeds, 30 to 1450 r.p.m.
Size of motor . . . ½ or ½ h.p., 1750 r.p.m.
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(Continued from page 22A)

Teachers College at Terre Haute, Ind., in 1931 and received the B. S. degree in industrial arts education. In 1937 he completed the graduate work required for the A.M. degree, Teachers College, Columbia University, New York City. He expects to complete the doctorate at the George Washington University.

Professor Gallington is past president, Grand Chapter, Iota Lambda Sigma Fraternity, honorary fraternity in industrial education; past president, Maryland Vocational Association; and member of Phi Delta Kappa; and is active in the Society of American Military Engineers.

♦ H. P. HARSHBARGER, for 16 years head of the industrial education department at Maine Township high school, Des Plaines and Park Ridge, Ill., has been appointed assistant chief of education and training, Division of Vocational Rehabilitation, Veterans Administration, under Federal Civil Service.

Mr. Harshbarger's office and headquarters will be in the Boatsman Bank building, St. Louis, Mo. He will supervise training personnel in the five regional offices in the four states of Missouri, Kansas, Arkansas, and Oklahoma.

Mr. Harshbarger reported for duty March 28.

♦ CHARLES HILL, B.S. of The Stout Institute, 1942, and master of education, University of Oklahoma, will teach drafting in the engineering drafting department of Iowa State College, Ames, Iowa.

♦ LT. FRANK SCHROETER, U.S.N.R., B.S. of The Stout Institute, 1943, is teaching metalworking in the Eastern State Teachers College, Richmond, Ky.

♦ EINAR SIRO, B.S. of The Stout Institute, 1933, and M.A., University of Minnesota, will be on the teaching staff of the Washington State College at Pullman during the summer of 1946. During the war Mr. Siro was a teacher trainer under Col. Fryklund in the Armored Force School at Fort Knox, Ky.

♦ LT. JACK HELLUM, U.S.N.R., is now teaching in the North Dakota State School of Science at Wahpeton. Mr. Hellum was graduated from The Stout Institute in 1938.

♦ HERBERT ANDERSON, B.S. of 1944, and Raymond Christman, B.S. of 1941, both of The Stout Institute, are now teaching in the Red Wing, Minn., public schools. Mr. Anderson supervises on-the-job training for veterans, and Mr. Christman is in charge of the metals program.

♦ STANLEY FOX, B.S. of 1938, and Duane Herald, B.S. of 1941, of The Stout Institute, have entered industry. The former is plant engineer, and the latter is plant maintenance foreman for Jostens Manufacturing Jewelers, of Owatonna, Minn.

♦ FRANCIS MODLIN has been appointed instructor of the day trade printing class which was started in Arkansas City, Kans.

♦ A. G. BROWN of The Stout Institute, Menomonie, Wis., has been named chairman of the subcommittee on the role of the counselor and specialist. This subcommittee acts under the state-wide committee of curriculum planning. Other members of Mr. Brown's committee are: Dr. A. H. Edgerton of the University of Wisconsin, and John H. Armstrong of the State Department of Public Instruction.

♦ W. A. SIMPSON will teach a day trade automechanics course at Highland Park, Topeka, Kans.

♦ MERLE (Butch) ALLEN has been appointed counselor for veterans by the Coffeyville, Kans., board of education. He will also assist with on-the-job training program for veterans. Mr. Allen, formerly on the Coffeyville Junior College science staff, returns after serving 56 months with the armed forces. Before our entrance into the war he was called into service because of his status as a reserve officer. At the time of separation he held the rank of Lieutenant Colonel.

♦ JOE WHEELER, industrial education instructor, Coffeyville, Kans., is in charge of the related instruction for the day trade machine-shop and welding classes. He worked several summers during the war as a machinist and inspector in one of the factories.

♦ JOHN WELTY, a general shop teacher of Argos, Ind., has moved to the general shop in the junior high school, New Castle, Ind.

♦ CHARLES HAMMERLE, after serving in the navy for 3 years, is now teaching industrial arts and building trades at Petersburg, Ind.

♦ WILLIAM HOLT has been made principal of the high school at Rensselaer, Ind. He is a graduate of Indiana State and he went to Rensselaer several years ago as teacher of industrial arts.

♦ EDGAR REDMAN has been given charge of the industrial arts and vocational program at the high school, Rushville, Ind.

♦ MAX HANNUN has been appointed instructor of industrial arts at Tipton, Ind.

♦ FRANK MAYFIELD, who was teaching industrial arts and coaching in the Gerstmeyer Technical High School before enlisting in the U. S. Navy, has returned.

He is assisting Mr. Isaacs in the vocational program in Terre Haute and also spending part of his time assisting veterans in the apprenticeship program and on-the-job training.

♦ W. A. Ross has been appointed consultant in public service occupations, vocational education division, U. S. Office of Education. He has served in an acting capacity since 1943.

♦ THOMAS NULL has been appointed co-ordinator of the co-operative office training program at Western Michigan College of Education, Kalamazoo, Mich.

♦ HARRY A. PEDERSON, formerly in the Instructor Training Department, The Armored School, Fort Knox, Ky., and recently part-time instructor in the Industrial Education Department of the University of Minnesota, began his new duties February 1 in the Industrial Arts Department, State Teachers College, Platteville, Wis.

♦ NORMAN FRIES, assistant principal at Galesville, Wis., has been made supervising principal of the Galesville schools to take the place of Leroy Jenson.

♦ J. F. WILLIAMS, JR., state supervisor of agricultural education, Tallahassee, Fla., died December 26, 1945, following a major operation.

(Continued on page 26A)

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(Continued from page 24A)

Mr. Williams was appointed state supervisor of agricultural education in 1927. Prior to that time he taught vocational agriculture in Chiefland and Alachua, Fla. He had been very active in the Florida Vocational Association as president and in other official capacities. He was a director in the Florida Education Association and state adviser to the Future Farmers of Florida.

♦ The following new faculty members have been appointed at The David Ranken Jr. School of Mechanical Trades, St. Louis, Mo.:

W. W. Absher, instructor in first year refrigeration; PAUL A. BARETTE, English; W. H. BEVAN, refrigeration; CLAUDE BLATTI, machine-shop practice; HAROLD J. BOOTH, JOHN CURLEY, air conditioning; WM. L. GABBERT, electrical appliances; PAUL S. HAYDEN, automobile department; JAMES W. HEALY, refrigeration; HENRY HEUMAN, refrigeration; E. A. HILL, refrigeration; JOHN P. KIBLER, refrigeration; L. J. LA FOND, veterans counselor and auto mechanics; CLARENCE E. LANE, drafting; ERVIE T. LUTES, radio; HUGH MCBAIN, automobile department; and EDWARD L. MERRIS, automobile department.

♦ LESLIE J. NUTTING has been appointed assistant state supervisor for trade and industrial education in the state department of education for Massachusetts.

♦ JAMES R. COXEN, recently released from the navy, has returned to the U. S. Office of Education. Lt. Commander Coxen becomes chief of the research and statistical service in the vocational education division.

♦ LEROY JENSON, supervising principal of the grade and high schools at Galesville, Wis., for the past five and one half years, was appointed to the faculty of the Milwaukee Vocational School as a mathematics instructor.

♦ THOMAS DOYLE and CHARLES E. MATTE have been appointed evening school instructors at the Diman Vocational High School, Fall River, Mass.

♦ ARTHUR WALKER has been appointed state supervisor of office training in Virginia.

♦ W. T. MARKHAM, Topeka, Kans., supervisor of occupational information and guidance, Kansas State Board for Vocational Education, and former state superintendent of public instruction in Kansas, died suddenly at Dodge City, Kans., January 18, 1946.

Mr. Markham was born in the hill country of Virginia, October 22, 1885. When Markham was ten, his parents moved to Kansas and four years later to a farm in the Ozark country. During this time Mr. Markham was going to school, reading, and studying. When 19 years old he began teaching school and finally completed Campbell College at Holton. The University of Kansas conferred on him the master's degree in 1926, and he later did additional work at Harvard. His thesis at the Kansas University became the "Markham Vocabulary Tests," and was used for many years in colleges and high schools in testing students.

All of his life Mr. Markham was engaged in schoolwork. In his guidance work he made numerous studies and was the author of over 50 bulletins that help youth to select vocations.

♦ S. C. SWENSEN, mathematics teacher at Boys Technical High School, Milwaukee, Wis., for 17 years, died March 17, 1946, after being ill since November.

He was born in St. James, Minn., in 1889. He was a graduate of St. Olaf's College and received his master's degree at the University of Wisconsin. Before coming to Milwaukee in 1929, he taught at Owatonna, Minn.; Lake Park, Minn.; and Brandon, S. Dak.

Association News

THE THIRTY-NINTH ANNUAL A.V.A. CONVENTION

(*Continued from page 24A of the April, 1946, issue*)

The meeting of the industrial-arts section on the afternoon of Thursday, February 7, took up the question of "Industrial Arts Teacher Training."

Frank C. Moore, A.V.A. vice-president for industrial arts, and director of industrial arts, board of education, Cleveland, Ohio, was the chairman.

T. A. Hippaka, professor of industrial education, Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa, in speaking on the subject of "Selection of Students" emphasized strongly that teacher trainers and industrial-arts instructors owe it to their profession to sell the idea of teacher preparation to students who show abilities in this field.

George B. Cox, head of the industrial-arts department, School of Engineering and Industrial Arts, Oregon State College, Corvallis, Ore., carried this theme still further in his address, "Types of Training."

Lawrence F. Ashley, chief division of vocational education, board of education, Yonkers, N. Y., discussed the value of "Industrial Experience" to the industrial-arts teacher and advised all such teachers to obtain such experience either before or after getting teacher training.

Gordon Wilber, director, division of industrial-arts teacher education, State Teachers College, Oswego, N. Y., was the discussion leader, and members of the audience freely entered into the deliberations on the subjects that had been presented.

At the industrial-arts sectional meeting on Friday afternoon at which Roy G. Fales, state supervisor of industrial arts, Albany, N. Y., presided, Carl H. Hamburger, supervisor of industrial arts, board of education, Cleveland, Ohio, pointed out that elementary industrial arts and crafts are now spread from kindergarten through the junior high school grades. He described, among other things, the excellent radio handcraft program carried on in the Cleveland schools.

Stanley Pawelek, supervisor of industrial edu-

(Continued on page 29A)

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1,742 Lighted Pictures
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24 Slidefilms
$65.00

1,128 Lighted Pictures
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(Safe Practices in Woodworking)
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392 Lighted Pictures
Selling America
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$120.00

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Aircraft Mechanics
47 Slidefilms
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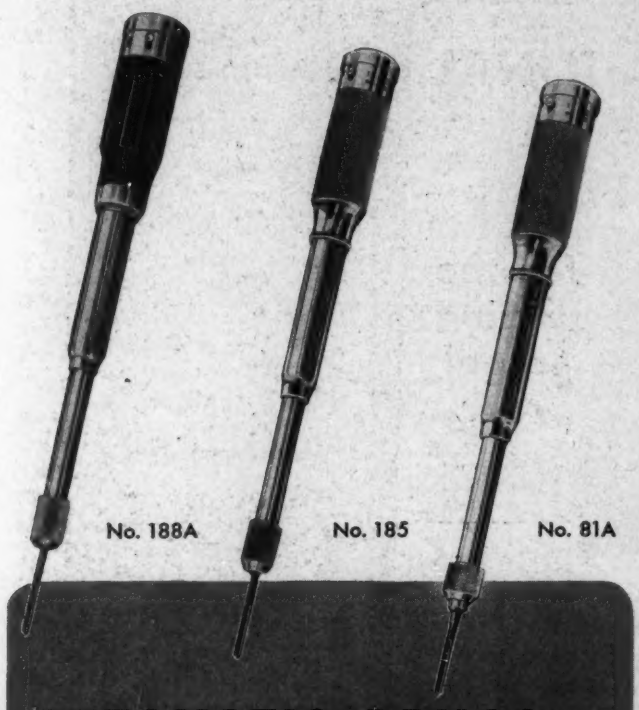

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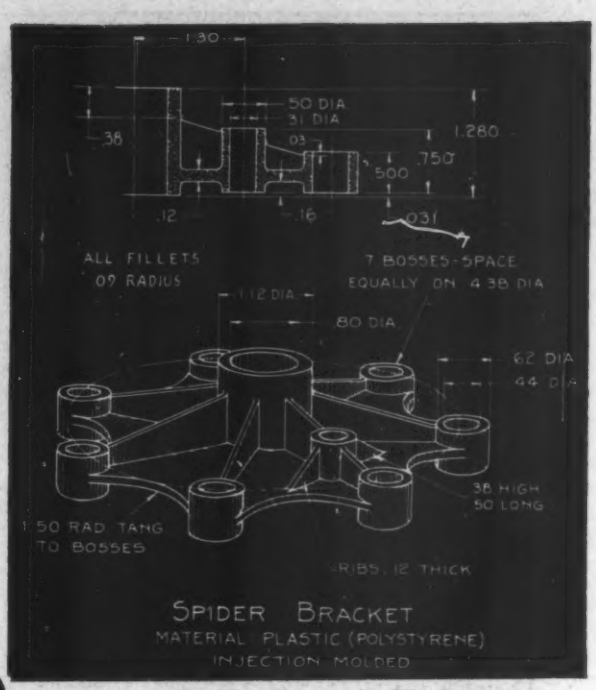

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(Continued from page 26A)

cation, Baltimore, Md., in his address on "Junior High School Industrial Arts," spoke strongly for the adoption of a uniform set of objectives and a sound philosophy for industrial arts in this country.

He also emphasized that, as a rule, college trained industrial-arts teachers — not engineering graduates, nor tradesmen — are the best teachers of the subject for junior high school students.

J. Osborne Johnson, director of industrial arts and special services, Denver, Colo., spoke on "Senior High School Industrial Arts."

At the Saturday morning meeting, which was presided over by Stewart F. Ball, supervisor of industrial arts, board of education, Buffalo, N. Y., Edgar Strong, instructor of industrial arts, Geneva High School, Geneva, N. Y., gave a most excellent talk on "Ceramics for Boys."

C. A. Backlin, manager, B. & I. Manufacturing Co., Burlington, Wis., gave a very fine demonstration on "Cutting and Polishing Stones (lapidary work)."

At the annual banquet on Thursday evening, M. D. Mobley, president, American Vocational Association, Inc., and state director of vocational education, State Department of Education, Atlanta, Ga., presided, and Ralph S. Foss, McGraw-Hill Book Co., New York City, in his inimitable way, acted as toastmaster.

J. C. Wright, U. S. Assistant Commissioner for Vocational Education, U. S. Office of Education, Washington, D. C., delving into the rich background of his 51 years in education, 40 of which were spent in vocational education, presented an excellent picture of what vocational education has done and what still must be done in the future.

Dwayne Orton, director of education, International Business Machines Corp., New York City, in a similar way pointed out that the problems of the future must be solved by adapting the things we learned the hard way in the past.

At the House of Delegates on Friday afternoon, the following resolutions were adopted:

1. The Resolutions Committee in 1946 wishes to emphasize that it is in hearty accord with the procedure of the Resolutions Committee in 1944, which drafted such statements of basic policy as would constitute a general platform for vocational education in the United States.

2. The American Vocational Association reaffirms its strong belief that it is a part of our fundamental philosophy of vocational education that economic independence for the individual is a vital cornerstone of the democratic way of life. It is our belief, therefore, that education for earning a living should be an integral part of all programs designed to educate for life in a democratic society. The Association recommends that the platform of the American Vocational Association as adopted at the Baltimore Convention which incorporates this philosophy be redistributed to our membership.

3. The accomplishments of vocational education in making possible the production of the materials of war have made the nation more conscious of the need for offering vocational training opportunities for all youth and adults who desire to take advantage of them.

In order for such opportunities to be offered, it is necessary that federal, state, and local funds must be available for vocational education purposes on a greatly expanded basis. In addition to normal needs in making vocational education opportunities available to all, special provision must be made for veterans of military service, workers in industry, business and agriculture who need reconversion training and women who are returning to normal homemaking occupations.

While local communities are willing to contribute, to the limit of their financial ability, local funds must be supplemented by increased federal and state funds if adequate opportunities in vocational education are to be provided.

4. The American Vocational Association recognizes its deep obligation to the men and women who sacrificed so much and through their victories on the battle fronts of the world brought great honor to our country and to us.

The Congress in passing Public Law 346 has recognized our debt to these young veterans and has provided sufficient funds to the Veterans Administration to make educational and training opportunities available to veterans. State authorities have been delegated the responsibilities for approving educational and on-the-job training for veterans.

While funds are provided for the cost of training in approved institutions and for sustaining the veteran while availing himself of all training opportunities, no federal funds have been allotted to state agencies to carry out the functions of approving educational institutions and places where veterans may be trained on the job and to aid state agencies in providing the necessary supervision to assure the effectiveness of the training.

We, therefore, recommend that the administrator of the Veterans Administration in Washington be requested, by a Committee of the American Vocational Association, co-operating with other educational associations, to authorize the allocation of funds appropriated to the Veterans Administration to the agencies of the several states, to enable them to properly discharge the responsibilities given them.

5. Public Law 457, known as the Surplus Property Act of 1944, provides that the Surplus Property Administration shall take into consideration any benefit that has accrued or may accrue to the government as a result of increased and improved educational facilities; and

It is in the best interest of the public to recognize and establish a policy of equitable distribution to tax-supported and nonprofit tax exempt educational institutions and schools, at a nominal cost, surplus property which could be used effectively in their programs of education and training, to meet the needs of the schools which have been intensified greatly by the rapid demobilization of our armed forces.

We recommend that the public agencies responsible for the administration of this act be urged to interpret its provisions so that:

a) Surplus property which can be used effectively be made available to schools on an equitable basis at a price not to exceed handling and shipping costs.

b) Reasonable supplies of surplus property shall be reserved for disposal to educational institutions and schools.

c) At least 30 days from receipt of notice of available surplus be allowed to educational institutions to place their order.

d) Minimum lots available be reduced, to allow reasonable facility in the disposal of surplus property for small educational units.

e) Pooling of orders from educational claimants be encouraged and it is further recommended that the

(Continued on next page)

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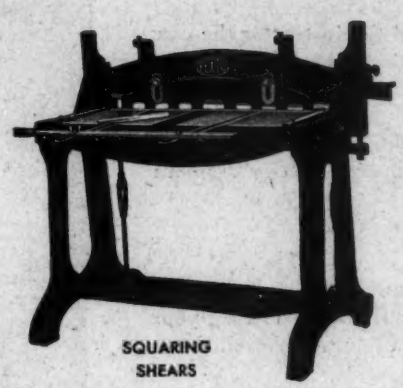

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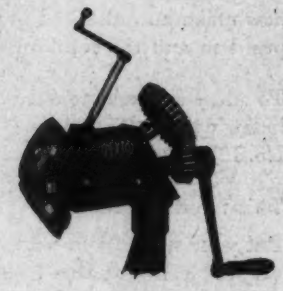
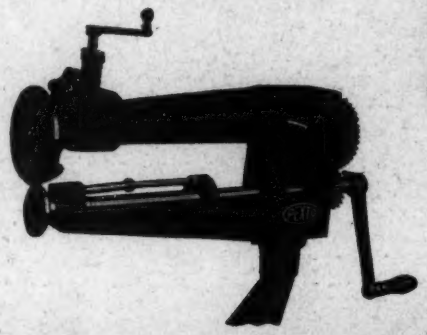


SETTING DOWN MACHINES



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(Continued from previous page)

present policy of donation of excess property be continued and liberalized to further aid tax-supported and nonprofit educational institutions.

6. The authorities responsible for administering vocational education in the United States have recognized throughout the years that much of the value and strength of our program results from local community and state planning. Your Resolutions Committee, therefore, strongly recommends that the American Vocational Association assume the leadership in initiating a series of state or regional vocational Education Planning Conferences. Such conferences should include participation by vocational educators, school administrators, and representatives of lay groups, and should explore the needs of vocational education.

7. We are in accord with the resolution adopted at the 1944 A.V.A. convention which recommended that in order to provide equal vocational opportunities for all, area vocational schools should be established. The American Vocational Association wishes to re-emphasize the need for area vocational schools and recommends that each state appoint a committee, composed of vocational educators, school administrators, and lay representatives, which would prepare a tentative plan for the organization and establishment of such area vocational schools as may be needed. It is further recommended that in states with no experience in this phase of education, a limited number of schools be etasblished on an experimental basis at the earliest practicable date.

8. The American Vocational Association has recognized the need for including instruction in safety within the vocational education program by co-operating with the National Safety Council in the appointment of a joint committee. Such programs of safety education differ so widely in different fields of vocational education, your committee on resolutions recommends to the A.V.A. Executive Committee that in future convention programs such discussions on safety education be integrated within the different sectional programs.

9. It is a well-founded belief of the American Vocational Association that the field services and the bulletin materials as they have been made available by our Federal Vocational Education Service throughout the years have made a noteworthy contribution for the advancement of vocational education in the United States. We recommend, therefore, that in this period of reconversion and expansion, these services be enlarged, not for the purposes of inspection or the formulation of additional regulations but rather that additional professional services be provided to the states. It is recommended that the A.V.A. Executive Committee take such action as is necessary to make this recommendation effective and that copies of this resolution be transmitted to the Secretary of the Federal Security Agency and the U. S. Commissioner of Education.

10. The American Vocational Association re-emphasizes its belief that federal aid should be provided for general education particularly where such aid is needed for the equalization of educational opportunities. Our Association recognizes that there are certain basic understandings which are necessary for proper participation in our democratic form of government. We believe in such federal support for general education as will attain these objectives.

11. The American Vocational Association wishes to express its deep appreciation for the hearty co-operation given by veterans organizations and agencies, by lay groups which have a common interest in vocational education, by interested school officials, and by such agencies of government as have co-operated with the vocational educators of the nation. Many of these co-operating interests have not only supported appropriations for vocational education but have co-operated actively in the conduct of our program.

12. We are especially grateful to the vocational education staff of the U. S. Office of Education for their valued contributions to the many programs of this convention.

13. We take pleasure in thanking the local convention committee in Buffalo and the state committee in New York, the convention bureau and the headquarters hotel on the excellent accommodations and entertainment provided for this convention. To entertain the convention at this difficult time is a distinct contribution to the cause of vocational education.

14. It is with most serious regret that the members of the A.V.A. note the retirement of Dr. J. C. Wright, our national leader and trusted guide for a long period of years. Those of us who have been associated with him most intimately know of his priceless contribution to the cause of vocational education. He has been a pioneer among pioneers. We can only wish for him those rich satisfactions which result from having given so much to a great cause.

To his successor, Dr. R. W. Gregory, we pledge our loyalty and our nationwide support. He is assuming his new responsibilities in a period when vocational education is facing new problems. Dr. Gregory has advanced through the ranks. He has been one of us; we believe he comprehends our problems. We appreciate the opportunity to congratulate him on his appointment and express our confidence in his ability to solve the many problems which will confront him.

We are truly appreciative of the efforts of President Mobley, Secretary Dennis, and other members of the A.V.A. executive committee and the various program chairmen in making the sessions of this convention so interesting and profitable. We are doubly grateful to President Mobley for his valued contribution to our legislative program. It is to Mr. Dennis that we wish to express our unbounded confidence and appreciation for his conduct of our national office since its establishment. The exacting requirements of our national office are little realized by the vast majority of our membership. Contacts must be maintained with a multitude of organizations and agencies. Successful promotion of legislation requires days and nights and months and years of exacting, intelligent effort. The present legislative situation is particularly difficult. Congress and the entire nation are in a state of unrest. The demands for vocational education have been increased. In this difficult period, we wish to express our gratitude to Mr. Dennis for his untiring efforts and his many notable attainments of the past, and voice our confidence in his ability to carry on, in the future.

15. In closing, your Committee on Resolutions wishes to call attention to the need for the continuation of a vigorous, aggressive, virile, national, state, and local leadership of those on a level which has characterized the vocational education movement. A large number of the pioneers in vocational education are no longer actively with us. A new generation of vocational workers must meet the challenge and keep the faith. Some principles and policies of the early years are fundamental. We must maintain high standards of vocational education. We must not weaken in the administration and supervision of such standards. While encouraging closer professional associations, vocational education can only be valuable and useful to the extent to which it maintains close relationship with the employer, the worker, the homemaker and the farmer whom it serves. Federal appropriations receive their impetus not from members of Congress nor from national legislative committes, but rather from the masses of people who have a sincere belief in the value of vocational education.

The opportunities in vocational education are many. As one school administrator has remarked: "There are

(Continued on page 32A)

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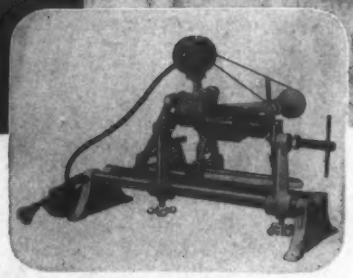

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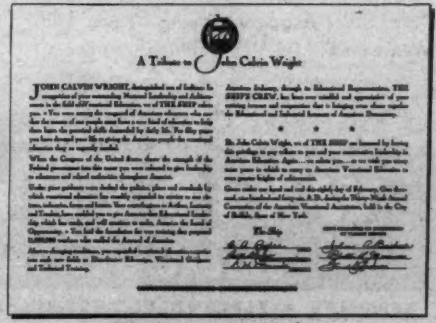
(Continued from page 30A)

such varied opportunities for progress in vocational education in the 25 years which are ahead of us that we may wonder how the earlier workers in vocational education made use of their time."

Opportunities do not develop themselves. Their future is in your hands. We can be satisfied with the program of the past or we can exercise the creative ability, possess the courage, and assume the responsibility to qualify as a new generation of pioneers. Our first national task is the promotion of legislation which will provide more adequate federal appropriations for an expanded program.

The members of the resolutions committee were: Dolph Camp, Arkansas; Hamden L. Forkner, New York; Verne C. Fryklund, Wisconsin; W. Howard Martin, Vermont; Mattie Pattison, Iowa; O. F. Wise, Alabama; M. Norcross Stratton, Massachusetts; and Ray Fife, Ohio, chairman.

The following new officers were elected: C. L. Greiber, president (elected for one-year term), State Board for Vocational and Adult Education, Madison, Wis.; H. C. Fetterolf, vice-president for agricultural education, State Department of Public Instruction, Harrisburg, Pa.; Grace M. Henderson, vice-president for part-time schools, University of Arkansas, Fayetteville, Ark. M. D. Mobley remains as a member of the executive committee as past president for vocational guidance. Charles W. Sylvester was re-elected treasurer for a one-year term.



A Tribute to John Calvin Wright

JOHN CALVIN WRIGHT, [illegible]

Dr. John Calvin Wright, [illegible]

Citation presented to Dr. John C. Wright

The following problems were extensively discussed at numerous meetings during the convention: surplus equipment and how to obtain it, apprenticeship training, trade and industrial teacher training, area vocational schools, rehabilitation, veteran training, vocational school buildings and equipping problems, and things learned from the war-production training experiences.

At the Ship's program, Ralph S. Foss officiated as deck officer. He was assisted by a goodly number of his efficient crew.

William Lasher, American Technical Society, Chicago, Ill., led in the singing while H. Lew Webb, also of the American Technical Society, was the accompanist at the piano.

The 1946 Ship citation was presented to Dr. J. C. Wright, retiring assistant U. S. Commissioner for Vocational Education.

The convention city for the next A.V.A. Convention will be announced at a later date.

♦ Otis H. Chidester, director of the graphic arts department of Tucson Senior High School, Tucson, Ariz., has been elected president of the National Association for Printing Education by the members' mail ballot. Other officers elected were Leroy Brewington, Kansas State Teachers College, as vice-president, and Herman A. Slater of American Type Founders, Elizabeth, N. J., as treasurer. Newly elected members of the board of directors are: Charles S. Newman, Rochester, N. Y.; George R. Deuel, Pittsburgh, Pa.; Everett V. Harris, Atlanta, Ga. (re-elected); Edward W. Kurtz, Detroit, Mich.; Harold L. Chesterman, St. Charles, Ill.; Aubrey M. White, Fort Worth, Tex.; Windsor A. Straw, Brookings, S. Dak.; and Selmer O. Wake, Santa Barbara, Calif.

Members of the board who continue in office are: Herbert B. Downs, Newton Hlds., Mass.; Arthur S. Williams, Washington, D. C.; Herman A. Slater, Elizabeth, N. J.; John C. Tranbarger, Terre Haute, Ind.; Ignacio L. Guzman, Tuskegee Institute, Ala.; Leroy Brewington, Pittsburg, Kans.; and Oscar A. Goetze, Golden, Colo. George R. Deuel is director of the Student Honor Club activities, and Staley Berryman of Evansville, Ind., is the new executive secretary, succeeding Harold G. Crankshaw, past president and executive secretary for the past three years.—*Harold G. Crankshaw.*

♦ The Massachusetts Industrial Education Society met in Boston on January 19 for a dinner at the Hotel Lenox. The president of the association, Americo B. Ventura, presided.

A. Russell Mack, state supervisor of secondary education, spoke to the group about postwar planning for the thirteenth and fourteenth grades in our larger high schools. He also advocated industrial arts through grades 7, 8, 9, and 10, and specialization for advanced grades.

Dr. Donald Durrell, dean of education at Boston University, stressed the importance of hand skills and industrial knowledge for all students, especially college preparatory.

Boston school committeeman Clem Norton spoke on the necessity for planning education to fit the pupils' needs instead of trying to make the pupils fit into antiquated fixed curriculums.

Other speakers were James Hammond representing Dr. William J. Saunders, president of the Fitchburg State Teachers College, who was unable to attend, and Percy F. Marsaw representing the American Industrial Arts Association.

Also introduced were Otto Salak, president of the New England Industrial Arts Association; William J. Bettencourt, president of the Massachusetts Mechanical Drawing Teachers Association; and Mr. Emerson, past director of industrial arts in Boston.

♦ The spring convention of the Wisconsin Association of Vocational and Adult Education will be held at Milwaukee, April 26 and 27, at the Schroeder Hotel.

It is important that board members, administrators, supervisors, and teachers, plan to contribute to making this convention thoroughly successful.

(Continued on page 35A)

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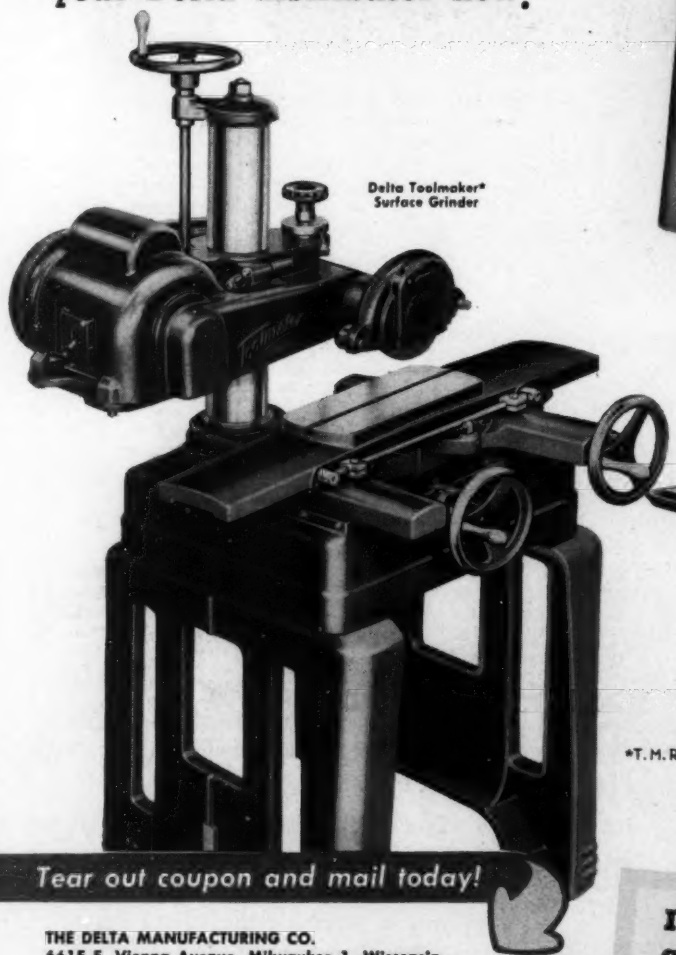

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(Continued from page 32A)

♦ The Epsilon Pi Tau spring conference and the annual executive conference of the American Industrial Arts Association will be held in Oak Park, Ill., on Friday, May 10 and Saturday, May 11, 1946. The Oak Park Arms Hotel has been selected as convention headquarters. Oak Park is a suburb of Chicago and is within thirty minutes' travel time from Chicago Loop hotels.

The theme chosen for general discussion is "Industrial Arts — Its Place in General Education."

At this meeting arrangements will be completed to participate in the N.E.A. meeting to be held July 1–6, 1946, in Buffalo.

♦ The industrial-arts division of the State University at Bowling Green, Ohio, was host at the January meeting of the Mid-Western Ohio Industrial Arts Association. Dr. Daniel J. Crowley, chairman of the division, presided, and in his introductory remarks stressed the graphic arts area of education as a phase of general education which needs to be expanded.

The feature address of the meeting was given by Lloyd W. Reese, former assistant state director of education for Ohio and recently a lieutenant commander in the United States navy.

The meeting was attended by a goodly number of superintendents, high school principals, and members of boards of education.

President VanMeter has announced that the next meeting of the Mid-Western Ohio Industrial Arts Association will be held in Lima, Ohio.

♦ The first postwar Annual Spring Conference for teachers of Industrial Arts and Farm Shopwork, guidance counselors, and supervisors, will be held at the State Teachers College, Oswego, N. Y., on May 2 and 3. The conference theme, "Industrial Arts in the Next Decade," will be exemplified by prominent speakers, shop demonstrations, and commercial exhibits. Frank C. Moore, director of industrial arts, Cleveland, Ohio, will speak at the conference and the annual banquet. — *William E. Huss.*

♦ The Pennsylvania Vocational Association will hold its summer conference at Eagles Mere, Pa., June 26 to 29, 1946. For reservations write to Mrs. Lang, Forest Inn, Eagles Mere, Pa.

♦ The National Graphic Arts Education Association, 719 Fifteenth St. N.W., Washington 5, D. C., has prepared an instructive leaflet for returned veterans, enumerating the advantages which a thorough training in one or the other phases of the printing industry offers.

April 23–26. American Association for Adult Education at Detroit, Mich. Morse A. Cartwright, 525 West 120th St., New York 27, N. Y., director.

April 25–27. Michigan Schoolmasters' Club at Ann Arbor, Mich. Leslie A. Butter, Michigan State Normal College, Ypsilanti, Mich., secretary. Headquarters, Rackham Bldg., Univ. of Michigan.

April 25–27. Eastern Arts Association at New York, N. Y. Mrs. Lillian D. Sweigart, State Teachers College, Kutztown, Pa., secretary. Headquarters, Hotel Pennsylvania.

April 26–27. Wisconsin Assoc. of School Administrators at Milwaukee, Wis. W. F. Waterpool, Marinette, Wis., secretary. Headquarters, Hotel Pfister.

April 26–27. Wisconsin Association of School Boards at Milwaukee, Wis. Mrs. Letha Bannerman, 1220 Highland Park Blvd., Wausau, Wis., secretary. Headquarters, Hotel Pfister.

April 26–27. Wisconsin State Board of Vocational and Adult Education Association at Milwaukee, Wis. C. D. Rejahl, 211 Commercial State Bank Bldg., Madison, Wis., secretary. Headquarters, Schroeder Hotel.

April 26–30. International Lighting Exposition at Chicago, Ill. E. H. Huerkamp, 326 W. Madison St., Chicago, Ill., chairman. Headquarters, Stevens Hotel.

May 2–4. Wisconsin Congress of Parents and Teachers at Sheboygan, Wis. Mrs. Otto L. Falk, 2406 No. 117th St., Wauwatosa 13, Wis., secretary.

May 3–4. Pennsylvania Industrial Arts State Conference at Millersville, Pa. Burl N. Osburn, State Teachers College, Millersville, Pa., dir. in charge. Headquarters, State Teachers College.

May 17–18. American Federation of Arts at Washington, D. C. Thomas C. Parker, Barr Building, Washington 6, D. C., secretary.

May 19–25. National Conference of Social Work at Buffalo, N. Y. Howard R. Knight, 82 North High St., Columbus, Ohio, secretary. Headquarters, Municipal Auditorium.

May 20–22. National Congress of Parents and Teachers at Denver, Colo. Mrs. W. A. Hastings, 600 South Michigan Ave., Chicago 5, Ill., president.

News Notes

♦ National Boys and Girls Week will be observed in many communities in the United States from April 27 to May 4, 1946. The celebration will mark the twenty-sixth annual observance of this important youth event.

With the theme, "Building for Tomorrow With the Youth of Today," the program is designed to focus the attention of the public on the problems, interests, and recreations of youth, and on the part played by the home, church, school, and youth-serving organizations in the development of character and good citizenship in growing boys and girls.

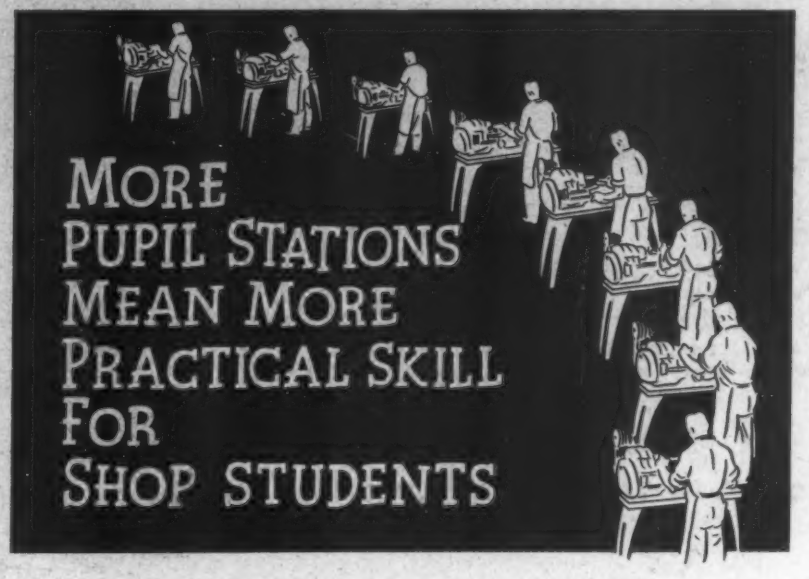
Information about Boys and Girls Week, and helpful suggestions for carrying out the program of the week, including a poster and a manual of suggestions, may be obtained free of charge from the National Boys and Girls Week Committee, 35 E. Wacker Drive, Chicago 1, Ill.

♦ The Society for the Promotion of Engineering Education, Polytechnic Institute of Brooklyn, Brooklyn, N. Y., announces a $1,000 award which will be given to the college or university teacher adjudged to have contributed most to the successful teaching of engineering students.

The award will be known as the George Westinghouse Award.

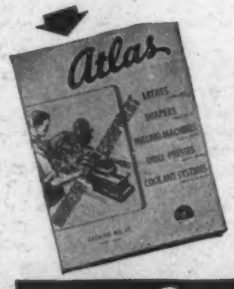
Nomination forms will be distributed to the

(Continued on next page)



Every vocational arts teacher feels the irony in the fact that in the typewriting classrooms, enough typewriters are provided to give students the individual practice they need . . . but shop students must *wait* their turn for machine tools, and have far too little opportunity to develop the skills they need for good jobs in industry.

Recognizing this situation, Atlas has kept its prices low to help you stretch your budget and move toward the goal of one machine for every two students. *An Atlas drill press costs much less than a typewriter, and an Atlas lathe costs but a few dollars more.*



Not only does Atlas give you more pupil stations for your equipment dollar, but compact Atlas design makes full use of limited floor space. Before placing your equipment orders see how Atlas tools enable you to give your students the utmost instruction and practice in all the fundamental machining functions. Send for latest catalog with complete tool specifications.

ATLAS PRESS COMPANY
571 N. Pitcher St., Kalamazoo 13D, Mich.

The horse that grew out of a bottle

A bottle of Higgins American India Ink, of course — for when Paul Brown, distinguished depictor of the sporting scene, does his vivid illustrations, he relies on Higgins Inks as his medium.

Why? For the excellent reason that Mr. Brown, like other top-ranking artists and designers, knows that, for control and accuracy of line, for precision performance and facility of use, Higgins American Drawing Inks are unsurpassed. Ask for this item by brand name for your protection.

THE INTERNATIONAL STANDARD OF EXCELLENCE

SINCE 1880

PAUL BROWN ILLUSTRATION FOR "GREAT HORSE STORIES", SELECTED BY PAGE COOPER, SOON TO BE PUBLISHED BY DOUBLEDAY.

HIGGINS INK CO., INC.
271 NINTH STREET, BROOKLYN 15, N.Y.

(Continued from previous page)

deans of the 165 engineering schools of the country and to the officers of national engineering societies. The award will be presented at the annual dinner on Saturday evening, June 22, in the Jefferson Hotel, St. Louis, Mo.

♦ Bradley Polytechnic Institute, Peoria, Ill., renames some of its buildings to honor Peoria pioneers. North Manual Arts Building will henceforth be known as Duryea Hall; South Manual Arts, Bennett Hall; Horology Building, Westlake Hall; Home Management House, Winchip Hall; Freshman Hall, Sisson House; Aviation Lab, Chanute Hall; and the Powerhouse, Holmes Hall.

♦ To show that disabled people are frequently able to handle a large variety of different jobs, and that there are many large companies who have found that disabled people maintain a production schedule equal to that of normal workers, with less absenteeism and turnover, the United States Office of Education with the co-operation of the Office of Vocational Rehabilitation, produced five motion pictures dealing with the attitudes and skills necessary for its solution in industry.

Two of the films, dealing with the problems of blind workers, were released last spring. The other three films are ready now:

OE 399. Employing Disabled Workers in Industry
OE 400. Instructing the Disabled Worker on the Job
OE 401. Establishing Working Relations for the Disabled Worker

These films are distributed by Castle Films, 30 Rockefeller Plaza, New York 20, N. Y.

♦ Successful operation at a gas temperature of 1350 F. has been accomplished in a series of successively increasing temperature tests on an Allis-Chalmers experimental gas turbine plant installed in the U. S. Naval Engineering Experiment Station at Annapolis, it was disclosed recently in the first announcement concerning this important project. Designed and built by Allis-Chalmers for eventual operation with hot gas at a temperature of 1500 F., the 3500 hp. unit is the first large multistage gas turbine for continuous power generation at high efficiency ever operated successfully at such high temperature.

Although this highly significant gas turbine has been developed as a navy project, its basic elements have characteristics suitable for both land and marine practice, and the Allis-Chalmers engineers foresee a promising future for gas turbines, particularly in railroad locomotives, aircraft propulsion units, marine, and electric power generation prime movers.

♦ The Victor Animatograph Corporation of Davenport, Iowa, has provided funds for two 4-H Club scholarships in visual education to the National Committee on Boys and Girls Club Work.

Contestants for the scholarships are required to show evidence of interest and experience in the operation of motion-picture projection equipment, use of cameras, slide films, slides, and other visual aids. According to the rules, the winners must include, as a minimum, at least one course in visual education.

♦ The United States Coast Guard is seeking the immediate enlistment of experienced aviation enlisted personnel for further experimentation and development of the Air-Sea Rescue Service. Men between 17 and 30 who have had experience as enlisted aviation men in other services may enlist in the Coast Guard and receive the same rating they held before their discharge, providing it is not above second class petty officer. Men who have had over 90 days' active duty in the U. S. Navy will not be required to re-take indoctrination training. Men between 17 and 25 with no previous military service will find a good field in aviation mechanical training in the Coast Guard. All training schools are open right now; these include aerographer's mate, aviation electronic technician's mate, aviation medical technician, aviation machinist's mate, link trainer, and radio direction finder and maintenance. Other schools, such as electrician's mate, loran operator, motor machinist's mate, radar operator, and radioman, are also open for graduates of recruit training. Application should be made directly to the Coast Guard Recruiting Station, 7087 Plankinton Building, Milwaukee 3, Wis.

♦ How to find a job and what kind of a job to choose are questions of considerable importance to the student preparing to leave school for work, and no less so to the librarian, teacher, or counselor working with these young people.

(*Occupations: A Selected List of Pamphlets*, $2.25, The H. W. Wilson Co., 950–72 University Ave., New York 52, N. Y.)

The author of this book has selected about 1000 titles from several thousand pamphlets. These will help the applicant to select the job suitable for him.

Other helpful features of this book, to the librarian, teacher, or counselor, include: hints on the selection, indexing, filing, and use of occupational pamphlets.

A descriptive list of the publishing agencies in this field, with lists of their publications.

Lists of pamphlets on special subjects, as apprenticeship, charts and posters, choosing a career, occupations for the handicapped, and seeking the job.

♦ Veterans may complete for over a half-million permanent government jobs as a result of President Truman's recent order directing the U. S. Civil Service Commission to begin examinations at once for probational appointments.

Over a million federal workers were employed under war service regulations which went into effect in March, 1942. Many of these war service temporary or indefinite appointments have been eliminated or are now on their way out.

In the seventh region, which includes Illinois, Wisconsin, and Michigan, about 50,000 war service positions will be filled with probationary appointees, leading to permanent appointments.

(Continued on page 38A)

from **THE MACMILLAN COMPANY**
60 Fifth Avenue, New York 11

Vocational Texts that HELP THE TEACHER

To be published in June

AMERICA'S FABRICS

By Zelma Bendure and Gladys Pfeiffer

The most complete work on fabrics ever published, this book provides the knowledge needed by the textile technician, the retail store employee, and by anyone interested in clothing and the home fabrics. It gives the complete history of every fiber used today — wool, cotton, linen, silk, the several kinds of rayon, and all the new synthetics. It explains the special characteristics of each, its particular value for clothing, home decoration, or other uses, its reaction to dyes, cleaning, etc., the various kinds of fabrics into which it is made. It explains every step in the production of every type of yarn and fabric, including laces. It gives up-to-date information on the new finishing processes and accurate color illustrations of prints and dyes. It contains complete information on labelling and standards. Hundreds of photographs illustrate every fabric and the various steps in its production, and, at the end of the book there is a complete illustrated dictionary of fabrics. $10. (probable).

AIRCRAFT WOODWORK

By Col. Rollen H. Drake

This book contains all the instruction and background information needed to fulfill the woodwork requirements for an aircraft mechanic's license. The book is simply written and includes fully illustrated, step-by-step shop projects in the construction and repair of each wood structure and fabric- or plywood-covered part of aircraft. Full information is included on the different types of wood used for aircraft, the physical structure, properties and uses of each, and the defects for which the woodworker must watch in the selection of wood for each job. There is complete instruction on the use of all the woodworker's tools and on the various techniques involved in aircraft woodwork — gluing, joints and laminations, finishing processes, etc. There are also helpful chapters on blueprint reading and safety rules, and a glossary of technical terms. This is the first of a series of texts covering each aspect of the aircraft mechanic's work. $3.50 (probable)

SEND FOR COPIES ON APPROVAL

Let us send you copies of these texts to look over NOW, so that you will have time to requisition the number you will need for next terms' classes.

Teachers throughout the country are finding these texts useful

PRINCIPLES OF RADIO FOR OPERATORS

By Ralph Atherton

Very clearly, simply written. Covers electrical fundamentals and all parts of radio. Includes demonstrations for classroom or lab and useful lists of visual aids. $3.75

INTRODUCTION TO PRACTICAL RADIO

By D. J. Tucker

Gives the beginner thorough knowledge of the indispensable essentials for all types of radio work. Includes the necessary math at the points where it is used. $3.

SHOP JOB SHEETS IN RADIO

By R. N. Auble

Complete, practical training for radio service men in two manuals: 1 — Fundamentals; 2 — Service Problems. Each $1.65

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By S. N. LeCount and H. S. Dusenbery

Practical training in the installation, operation and maintenance of all electrical equipment on modern merchant ships. $3.50

AERODYNAMICS

By L. R. Parkinson

An excellent introduction to this subject for high school students, covering all basic theory and its practical applications. $2.25

SIMPLIFIED PUNCH & DIEMAKING

By James Walker and C. C. Taylor

Shows, step-by-step, how to design and construct every type of punch and die used in the fabrication of sheet metal. $5.00

LATHE OPERATIONS
MILLING MACHINE OPERATIONS

By Lewis E. King

Two practical manuals by the head of the Machine Shop Department in Detroit Aero Mechanics Vocational High School. Each $1.75

ENGINEERING PREVIEW

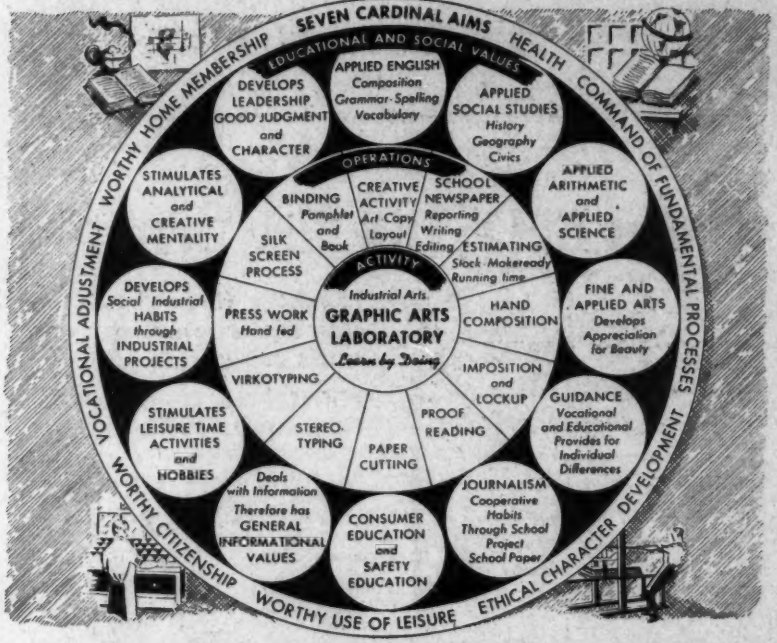
By L. E. Grinter and Others

Highly recommended for vocational guidance and for college preparatory work in engineering. $4.50

THE CRAFTSMAN PREPARES TO TEACH

By D. F. Jackey and M. L. Barlow

A very practical teacher's guide to the methods found most successful in organizing and teaching vocational courses. $2.00



The Seven Cardinal Aims of Secondary Education

as attained through the Graphic Arts Laboratory

This chart appears in a booklet, *"Graphic Arts . . . The Foundation of a Liberal Education,"* containing the philosophy and objectives of the graphic arts activity on the industrial arts level. Write for your copy of this interesting 16-page booklet. It is free.

• The graphic arts activity in junior and senior high schools is the ideal medium through which creative interest and vitality is given to the entire school program. No other activity is so rich in general educational and social values.

• Those interested in vocational guidance should also write for a copy of *"Facts about the Printing Industry for Schools"* with 10-page Guidance Addendum. This, too, is sent on request.

Department of Education • American Type Founders

200 ELMORA AVENUE, ELIZABETH B, N. J.

(Continued from page 36A)

Applications for these positions are to be filed through the agency direct, and appointing officers will have authority to hire qualified persons without putting them through the customary examinations of the Commission.

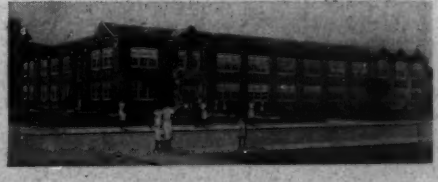
The principal instructions to the appointing officers state that first priority must go to disabled veterans, and second consideration must be for the nondisabled veterans, and third to displaced federal employees.

♦ A revised edition of a "Reference Handbook on Modern Home Laundering of Today's Washables," just released by the Home Economics Institute of the Westinghouse Electric Appliance Division at Mansfield, Ohio, comprises a basic manual on efficient home laundering divided into five sections: washing; drying; ironing; laundry planning; and buying of washables.

Each section is complete with step-by-step instructions for achieving proper results, plus the whys and wherefores underlying recommended practices. Where variations in the washables themselves affect laundering — as with silk, cottons, wools, rayons, and other man-made fabrics — each is covered separately and in detail. And where the laundering process entails the use of equipment, the function, construction, care, and use of said equipment is described.

The information in this 36-page manual is based on continuous research by the Company's Washability Laboratory and Home Economics Institute.

A sample copy is available free of charge to teachers and home economists and additional copies at five cents each, from the Westinghouse Home Economics Institute, Mansfield, Ohio.



Arts and crafts unit, Central College of Education, Mount Pleasant, Mich.

♦ The arts and crafts building illustrated herewith, will house the fine arts, home economics, and industrial-arts divisions at the Central Michigan College of Education, Mt. Pleasant, Mich.

The estimated cost of this building is $485,000, and the appropriation for its erection has already been made by the legislature. Roger Allen, A.I.A., 1126 Grand Rapids National Bank Bldg., Grand Rapids 2, Michigan., is the architect.

♦ A variety of course offerings in industrial education will be available at The Pennsylvania State College, during the main summer session for teachers, supervisors, and directors. Separate programs for undergraduates and graduates are available in vocational industrial education and industrial arts education. Courses are planned to meet the needs of those working toward certification as well as for those working on undergraduate and graduate degrees.

In addition to the regular staff, a number of visiting instructors will offer courses including, Dr. J. C. Wright, assistant commissioner in charge of vocational education, U. S. Office of Education; John A. McCarthy, state director of vocational education, New Jersey Department of Public Instruction; E. B. Porter, training officer, U. S. Bureau of Vocational Rehabilitation; Mark Walter, director of vocational rehabilitation, Pennsylvania Board of Vocational Education, and R. E. Iffert, special agent, U. S. Office of Education.

A series of special lectures to be announced later will bring several additional outstanding leaders in vocational education to the campus during the main summer session.

The summer session begins on July 1 and closes on August 9. Further details may be had on application to the Director of the Summer Session, The Pennsylvania State College, State College, Pa.

♦ An international wallpaper design competition, with $7,500 in prizes for the winners, will be conducted between April 1 and August 31 of this year, sponsored by United Wallpaper, Inc.

The grand prize winner in the contest will receive an award of $2,500, of which $1,500 is the prize for submitting the best wallpaper design in the entire competition, and $1,000 is the prize for the best design in one of the six classifications. These classifications are: living room, dining room, hall, bedroom, kitchen, and bathroom wallpaper designs. Six prizes of $1,000 each are offered the entrants who submit the best designs in these classifications.

Open to everyone, amateur and professional alike.

Complete information and rules governing the contest may be obtained by writing to International Design Competition, United Wallpaper, Inc., 3330 West Fillmore Street, Chicago.

♦ The postwar Alumcote series of aluminum finishes incorporating the latest war-proved technical advances is now available for civilian production.

The Alumcote protective coatings are available in nine types, each of which has been designed to meet specific requirements as to use and method of application. They make possible smoother, more brilliant, and more durable product finishes.

The Lithographer, container manufacturer and metal fabricator will find the new aluminum finish for black plate to be of definite interest from the standpoint of tin conservation.

For complete information write to The Watson-Standard Co., Pittsburgh 12, Pa.

♦ A 10-week trade extension course in carpentry has been started in the evening school of the Diman Vocational High School, Fall River, Mass.

FAVORITE OF THE FURNITURE FACTORIES

FRANKLIN *Liquid Hide* GLUE

AND BEST FOR SCHOOLS TOO!

HERE'S WHY

The ancient Egyptians relied on animal glue. Examples of their wood craftsmanship are on exhibition today in Cairo, age-old proof animal glue is strongest, holds the longest.

With Franklin you can do away with messy glue pots, for Franklin is used right from the can—AS IS! No unpleasant odor.

Franklin is fine for beginners because it eliminates chilled joints. The stronger, thinner glue line preserves the beauty of the grain and saves tools.

The fire hazard is eliminated with Franklin Glue because no heating is involved. It's ready to use, won't get sour or evaporate.

With class time short, Franklin makes it possible for your students to do more and better work. Always ready to use—cold on cold wood.

Leading wood craftsmen use Franklin Liquid Hide Glue. It's the standard in the wood-working industry.

No waste, just pour unused glue back in original container.

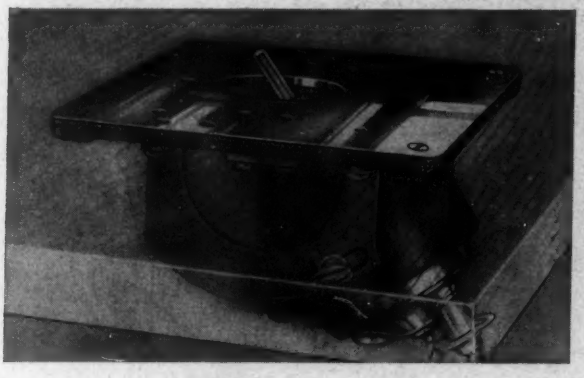
FREE SAMPLE . . . Write on your official school stationery.

THE FRANKLIN GLUE COMPANY

WHERE RESEARCH BROUGHT A GREATER GLUE

COLUMBUS 15, OHIO

MAKE your RS4A HAND SHAPER into a BENCH SHAPER that turns out professional quality mouldings and decorative furniture edges



Typical mouldings made with single cutters and with combinations of cutters.

Expand the usefulness of your Stanley-Carter RS4A Hand Shaper with this inexpensive Bench Shaper Plate. Uses only one end of a bench: doesn't interfere with other uses of bench. Easy to install. Just mortise out recess for flush mounting of plate, cut opening with compass saw for shaper shaft and mount with four screws. Tilt adjustment gives any angle up to 45° and every angle gives a different cut with the same cutter or combination of cutters. Complex moulding and decorative cuts made smoothly, easily and safely. Send coupon for full particulars.

WRITE FOR FOLDER SHOWING CUTTERS

Stanley-Carter Sales Dept. IA-546
STANLEY ELECTRIC TOOLS NEW BRITAIN, CONN.

MAIL THIS COUPON TODAY

Name.....
Title.....
School Name.....
City..... State.....

Detroit Public Library

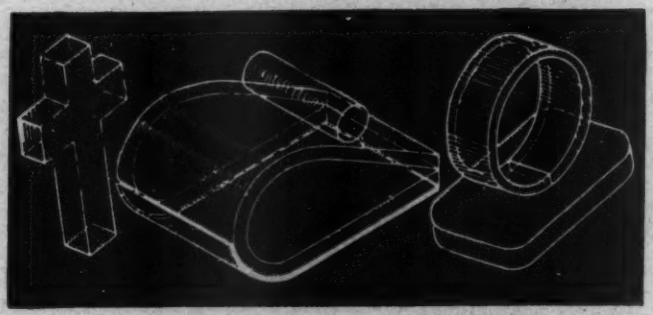
CARTER STANLEY TOOLS

Low-Cost Forge-Type FURNACES by PERECO for SCHOOL SHOP and LABORATORY

Pereco Electric Furnaces and Kilns are carefully engineered for top-notch performance, plus economy and dependability. Heat treating, annealing, carburizing, and other technical skills requiring use of temperatures up to 2700° F. are now taught with modern Pereco equipment in many leading schools and colleges. Heavy steel plate welded case construction; balanced insulation throughout; silicon carbide hearths; long-life globar heating elements; multi-step manual control of power input; operating safety; close temperature regulation . . . are all vital reasons for the efficient, trouble-free service of Pereco Furnaces. For full details on Pereco standard or special equipment for your school shop or laboratory — write today.

- SAFE TO USE
- LONG-LASTING
- EFFICIENT
- QUICK HEAT-UP
- EASILY OPERATED
- SPACE-SAVING

PERENY EQUIPMENT CO., Dept. F
842 N. Pearl St., Columbus, Ohio



DELIGHT YOUR CLASS WITH PROJECTS IN PLASTICS

How your students will enjoy working with plastics! Crystal-clear, easily carved, cut and shaped, plastics will enable them to produce finished products of true professional appearance, that will bring exclamations of admiration from friends and parents.

We can supply you with Plexiglas, Lucite, Bakelite, Tenite II, Lumarith, Lignolite, and other plastics in sheets, rods and tubes especially suited for the school workshop. Also available are project plans and complete fabricating information.

Send today for catalog, sample working drawings of six projects, and full details.

CARMEN-BRONSON CO.
165 East 3rd St., Dept. 5-V, Mt. Vernon, N.Y.

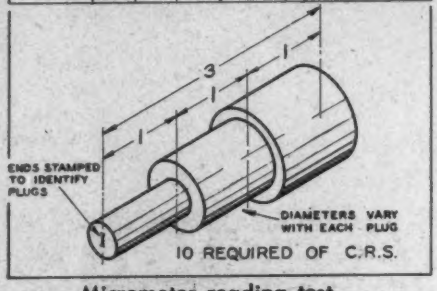
MICROMETER-READING TEST

LT. (j.g.) DONALD MALEY, U.S.N.R.
Educational Services Dept.
U. S. N. Hospital
Chelsea, Mass.

One of the first requirements in machine-shop training is to be able to read a micrometer. As a result of the importance of accuracy

MASTER SHEET

Plug	Sizes			Plug	Sizes		
A	3/16 .187	5/16 .312	13/32 .406	F	5/16 .312	13/32 .406	13/16 .812
B	1/4 .250	3/8 .375	3/4 .750	G	3/8 .375	17/32 .531	7/8 .875
C	7/16 .437	1/2 .500	13/16 .812	H	11/32 .343	9/16 .562	31/32 .968
D	9/32 .281	17/32 .531	7/8 .875	I	13/32 .406	3/4 .750	1 1.000
E	15/32 .468	5/8 .625	15/16 .937	J	5/16 .312	17/32 .531	31/32 .968



Micrometer reading test—master sheet

in reading the instrument, it is necessary to set up some very specific testing material that will determine very accurately the ability of a student to make proper readings.

A test may be very easily assembled and made in the beginning machine-shop course. It consists of ten turned steel plugs, each with three different diameters. As a result, each plug affords three different measurements to be made. The individual plug is identified by a letter stamped on the ends. The student first records the identifying letter and then marks adjacent to it the three measurements made. The pupil then takes up the next plug, and repeats the same operation. The student will complete working through the ten plugs and, as a result, will have made thirty different measurements.

In checking the test, the instructor has a key or master sheet with the correct size of each diameter noted by each plug letter. In this way, he can easily grade the student's ability to make measurements with the micrometer.

The plugs may also be used for testing the student's ability to make accurate measurements with an outside caliper. For the caliper measurements, the readings should be given in fractions of an inch.

In the machine shop the testing plugs may be assigned as beginning jobs for the students starting on lathe work. In order to make the piece, it requires the preliminary operations of measuring the stock to correct length, cutting the stock with a saw, and centering the material in the lathe. The lathe operations include straight turning, facing, and cutting shoulders.

It is important that the instructor have

(Continued on page 46A)

KEEP UP TO DATE ON ENGINE REPAIRS..

Teach the K&W MECHANICAL METHOD For Repairing Cracked Heads and Blocks

No engine repair course is complete today without study of the K&W Mechanical Method—the efficient time and money saving method that is guaranteed to restore cracked automotive and diesel engines to unimpaired service.

Used extensively by leading engine rebuilders, fleet operators, railroads and military repair centers, the K & W Mechanical Method has proved the most effective and economical means for repairing cracked engines.

Tools required to make K & W repairs are the type of portable power tools that are standard equipment in most school shops. All K & W literature plus complete training for Vocational Instructors is available without charge.

There's a big special section with illustrations and diagrams devoted exclusively to the "how" and "why" of the patented K & W Mechanical Method in the new K & W booklet—send for it today—it's free!

Nationally Advertised... The K&W Mechanical Method is advertised in Liberty, Popular Science and Popular Mechanics as well as in leading Automotive Trade Journals.

KNOW THE MECHANICAL METHOD—SEND FOR YOUR COPY OF THIS 16-PAGE K&W BOOKLET TODAY!

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Please send me the free K & W booklet:
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Shop Equipment News

New Products—Publications

THE DOALL SURFACE PLATE

A new surface plate of improved design has been announced by The DoAll Company (Gauge Division), Minneapolis, Minn. It has a 24 by 24-in. working area, and is made of a specially alloyed close grain iron. Careful annealing and treatment by alternate heat and extreme cold at various stages in production imparts a stability formerly obtained only by long periods of natural outdoor aging.

DoAll surface plate

A system of ribbing gives ample support to the working surface, so as to prevent any appreciable deflection in normal use. Three feet, placed so as to insure a minimum of sagging, are used to support the surface plate.

The working surface is pin-point hand scraped with 22 or more evenly distributed bearing spots per square inch. The maximum deviation of the bearing areas from a mean plane is .0002 in. over the entire surface.

The underside of the ¾-in. overhand on the surface plate is machined all around. Thus, work or fixtures can be easily and firmly clamped to the surface plate. The edge of the working surface has also been drilled and tapped on 2-in. centers all around to enable the user not only to make up gauges and comparators from The DoAll Company's Producto-Chek set, but to mount special fixtures of his own design.

The DoAll surface plate comes with removable handles and plywood cover. The inside of the cover is lined with a heavy oil-saturated felt so that the plate is well protected from rusting when not in use.

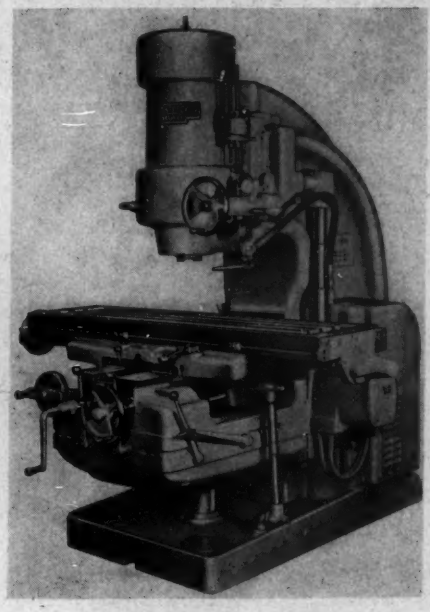
For brief reference use IAVE—1410.

CSM MILLING MACHINES ANNOUNCED

Kearney & Trecker Corp., Milwaukee, Wis., announces the CSM line of knee-type milling machines. Horizontal and vertical models are available in 20 h.p., 30 h.p., and 50 h.p. sizes.

The development of this line of machines is the result of experimental and research work in the application of carbides to a variety of milling problems. Experimentation in the use of these cutters on standard models of milling machines indicated the basic requirements of machines designed for maximum efficiency when milling steel with carbides. The CSM machines were designed to meet these requirements — increased rigidity, greater horsepower, and a more uniform flow of power to the spindle.

Power is transmitted to the spindle through multiple V belts and the spindle speed selection box. Sixteen quick-change speeds from 50 to 1250 revolutions per minute are in approximate geometrical progression. The spindle is provided with a center bearing spindle which reduces deflection eight times. A heavy flywheel is splined to the spindle and assures a uniform flow of power to the cutter.



CSM Milling machine

A feed and rapid traverse drive motor mounted on the right side of the knee furnishes power to the table feed mechanism. Thirty-two quick-change feed rates from ½ to 90 in. per minute in approximate geometrical progression are provided.

For brief reference use IAVE—1411.

POSTWAR BRADLEY WASH FOUNTAINS

Enameled iron and stainless steel wash fountains discontinued by the Bradley Washfountain Company during the war are again being added to their line of group washing equipment.

The new fountains have been redesigned and streamlined. Available in white enamel and stainless steel, they are particularly suited for installations requiring hygienic appearance as well as strength and durability to withstand the severe use to which industrial and public wash fixtures are often subjected.

They can serve as many as 8 to 10 persons simultaneously with clean running water and they assure users of maximum sanitation besides saving time, space, and installation costs.

Bradley wash fountain

The enameled iron bowls are pressed of one piece of steel, finished in white acid-resisting vitreous enamel. The stainless steel bowls are pressed from heavy gauge stainless steel. Both are available in roll rim or deep apron design.

The pedestals have been streamlined to afford accessibility to interior mechanisms by means of readily removable panels. They are available in 54 and 36-in. diameter sizes; circular or semicircular; hand or foot controlled and in types which meet every plumbing condition. Bulletin W-506 now available.

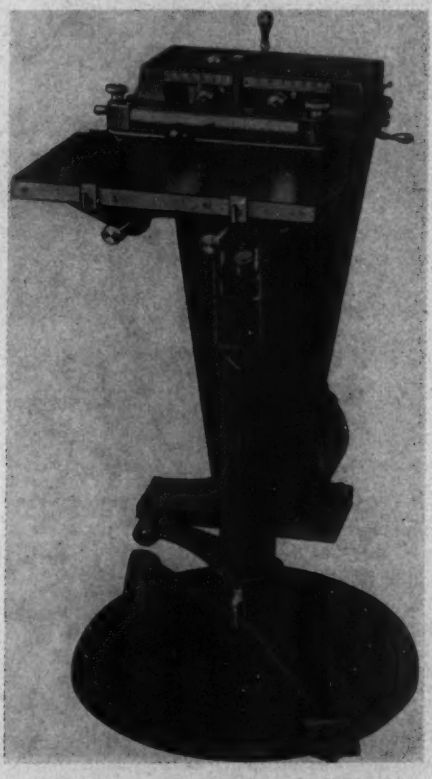
Address Bradley Washfountain Co., N. 22nd and Michigan Sts., Milwaukee 1, Wis.

For brief reference use IAVE—1412.

THE NEWTON TWO-SPINDLE BORER

The B-100 Newton 2-spindle borer is a newly designed, versatile, woodworking tool. It is sturdily built with adjustments for wear at all points that require them to maintain accuracy.

The work table is heavily ribbed. It is equipped with a foot treadle for raising or lowering. The



Double spindle boring machine

vertical table travel is 3½ in., and the horizontal travel is 5 in.

The borer handles bits up to and including ⅝ in. The spindles are adjustable horizontally from 1⅜-in. to 7½-in. centers. They run in grease-sealed ball bearings.

For further information write to J. D. Wallace and Co., 140 S. California Ave., Chicago 12, Ill. This firm is the national distributor for this new double spindle boring machine.

For brief reference use IAVE—1413.

FEED AND SPEED CALCULATOR

A new slide-rule type device is now available to machinists for calculating the proper "feed"

Handy calculator

(Continued on page 44A)

WHERE *Balance* COUNTS

Yes, tight rope walking means perfection in balance—perfection achieved by years of practice. In Plumb tools, too, balance—or "hang"—is a perfected quality, an accomplishment resulting from Plumb's century-old experience in making fine hand tools.

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(Continued from page 42A)

per tooth per revolution for all types of carbide milling cutters.

The device, called a "Feed and Speed Calculator," also shows the suggested rate of speed for machining many different kinds of materials to rough and finished states. The reverse side of the calculator shows the relation of revolutions per minute on the cutter head, and the surface speed in feet per minute, to the diameter of the work. Printed on it are a table of decimal equivalents of fractions.

The calculator can be obtained from Wendt-Sonis Company, Hannibal, Mo., makers of standard carbide tipped cutting tools.

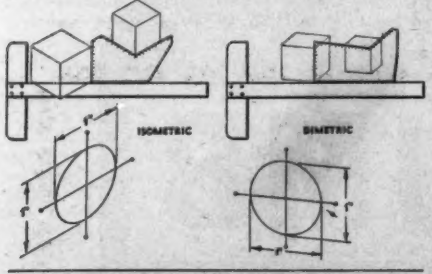
For brief reference use IAVE—1414.

MODERN DRAFTING AIDS

With the need for making the three-dimensional drawings now in vogue in industrial drafting rooms, the labor and time saving precision tools made by Instrumaster Industries will be found very helpful.

Axiometric representation has been found to be excellent for helping executives, salesmen, customers, assemblers, and checkers visualize and understand shapes and details which in the form of three-view drawings would perhaps have been entirely beyond their comprehension. The isometric and dimetric two-angle and ellipse stencils as well as the ellipse modifier manufactured by Instrumaster Industries, Greenwich, Conn., therefore, will be welcomed by the drafting instructors who must train the draftsmen of the future.

For brief reference use IAVE—1415.



Handy instruments for making three-dimensional drawings

WELDING ELECTRODES AND ACCESSORIES

The Hobart Brothers Company, Troy, Ohio, has just released a folder announcing their complete, postwar line of arc welding electrodes. This handy pocket-size folder furnishes description, application, procedure, physical properties of deposited metal, and sizes available for each type electrode in this new postwar line. A copy of this handy folder may be obtained by writing direct to The Hobart Brothers Company, Troy, Ohio. Ask for Folder DM-710.

This firm also has published a folder announcing a complete new line of arc welding accessories. Everything for the welder is described and illustrated in this folder. The items are all properly identified with catalog numbers. When writing to the manufacturer, request Folder DM-709.

For brief reference use IAVE—1416.

A PREVIEW

Machines scheduled for production in 1947, shown by the Walker Turner Co. of Plainfield, N. J., at the Cleveland, Ohio, Tool Show on April 8 to 12, included a 16-in. metal cutting band saw, a 20-in. power-feed drill press, and a redesigned 15-in. drill press.

The 16-in. band saw is equipped with a newly designed variable speed unit and patented mechanical feeding attachment.

The 20-in. drill press has a built-in power-feed unit.

For brief reference use IAVE—1417.

AWARDS IN PAASCHE AIRPAINTING CONTEST

Announcement has been made of the prize winners in the Air-Painting Contest conducted by Paasche Airbrush Company of Chicago. Many hundreds of entries were received from artists in all parts of the United States as well as foreign countries.

Cash prizes were awarded as follows: first prize, $250, to J. Greenleaf, 22 Friend St., Boston, Mass., subject "Cleaves Street"; second prize, $150, and honorable mention, $50, to L. Westbrook, 174 Atkins Ave., St. Louis, Mo., subjects "Summer Clouds" and "Village Church"; third prize, $100, to Art Harder, 2nd Floor, Mo. Pac. Bldg., Brooklyn, N. Y., subject "The World with Art."

The prize winning entries are displayed in the gallery of Air Paintings, at the Paasche Airbrush Company plant, 1909–23 Diversey Parkway, Chicago. This gallery is open at all times to students and artists interested in airbrush technique.

For brief reference use IAVE—1418.

A BOOK ON SANDING AND FINISHING

An 88-page booklet titled "Sanding and Finishing with Modern Coated Abrasives" has been made available by The Carborundum Company, Niagara Falls, N. Y.

This booklet describes the natural and artificial abrasives used by this firm in the manufacture of its coated abrasives, as well as in the production of its grinding wheels.

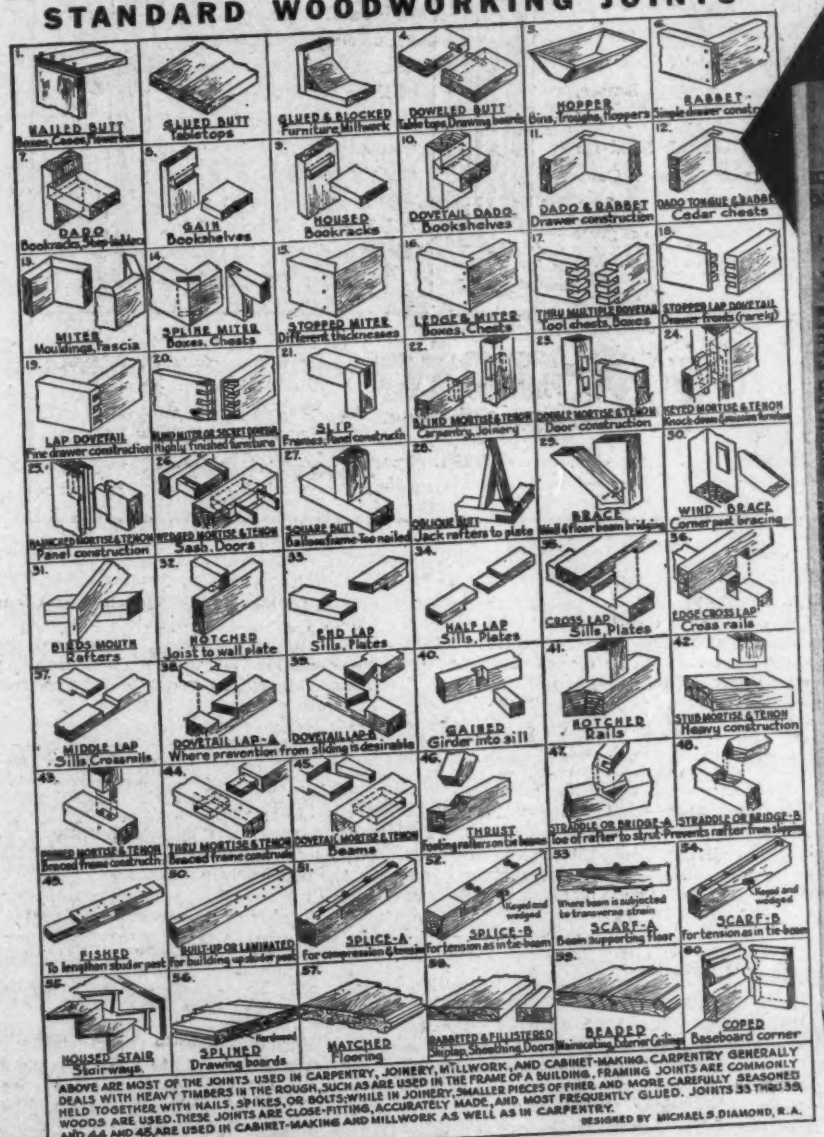
It also describes how the grains are classified, the various types of bonding material that are used, and the backing that is applied. Information also is given on how to identify the product and how it should be handled and stored.

Other necessary information, such as splice specifications, belt speeds, mandrel data, and the like, also is given.

The fiirm also has available a leaflet describing "Surface Preparation with Abrasive Belts."

For brief reference use IAVE—1419.

Wall Chart—FREE!



This timely teaching aid

So widespread was the initial demand for this Wall Chart (16½ x 27") that we are once again offering it for the benefit of those instructors who have not already received it. Made possible through your interest in MICROTOMIC VAN DYKE Drawing Pencils, it is available to you without cost or obligation.

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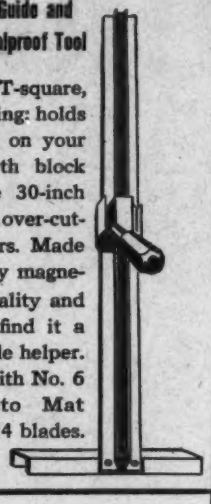

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*Reg. U. S. Pat. Off.

(Continued from page 41A)

several sets of these testing plugs made, to prevent the test from being memorized and passed on to the succeeding groups that take the test.

EXAMINATION OF AERONAUTICAL WORDS AND TERMS

W. C. FORD, SUPV.

Naval Training School
Glenn L. Martin Company
Middle River, Md.

I. Underline the correct definition.

1. Fuselage — (*a*) the entire structural part of an airplane; (*b*) the hull and wings of a seaplane; (*c*) the streamline structure of a plane which houses crew, passengers, and cargo.

2. Hull — (*a*) the wings and floats of a seaplane; (*b*) the body, or fuselage of a seaplane; (*c*) the term used for the complete structure of any airplane.

3. Power plant — (*a*) piece of equipment used as a source of power for operating lights on large planes; (*b*) an aircraft engine and accessories necessary to sustain flight; (*c*) the equipment used to furnish power around hangars and other aircraft installations.

4. Empennage — (*a*) the place where large airplanes and dirigibles are housed; (*b*) the sides of a large commercial plane; (*c*) the rear part of any plane.

5. Elevator — (*a*) a device used to raise crew and passengers when boarding a plane; (*b*) an auxiliary airfoil located on the empennage which regulates ascent and descent of an airplane; (*c*) an airfoil whose function is to regulate right and left movements of an airplane.

6. Aft — (*a*) the back or rear of any designated position; (*b*) the center portion of any vessel or aircraft; (c) the front or up front of any designated position.

7. Air frame — (*a*) the structure of an airplane less engine and controls; (*b*) the air blast that is forced over the wings by the engine; (*c*) a lighter than aircraft used in studying the weather and air currents.

8. Carburetor — (*a*) a device for mixing fuel and oil; (*b*) a device which separates the air from fuel so it can be consumed by the engine; (*c*) a device for mixing liquid fuel and air to form a combustible gaseous mixture.

9. Gyropilot — (*a*) a pilot who has had more than 1000 hours of flying time; (*b*) an instrument which replaces the copilot on large commercial planes; (*c*) an instrument which automatically controls an airplane about its three axes of angular movement.

10. Longeron — (*a*) a fore-and-aft member of the framing of an airplane fuselage or nacelle; (*b*) a long structural member running the entire length of the wings; (*c*) a term used for the longitude of an airplane at any given time.

11. Magnaflux — (*a*) a method used in testing metal for flaws; (*b*) an instrument used to locate the magnetic pole; (*c*) one of the chemical elements.

12. Oil can — (*a*) a can carried by all aircraft and containing an extra supply of fuel oil; (*b*) any portion of a plane that has been sprayed or splattered with oil; (c) an expression meaning that the skin is slightly bulged between rows of rivets on metal skin surfaces.

13. Port — (*a*) an opening, hole, or passage; (*b*) the time of departure; (c) the wall dividing sections of a plane.

14. Altimeter — (*a*) a term used to express altitude; (*b*) an instrument for measuring elevation; (*c*) a device for transforming feet into meters.

15. Relay — (*a*) a form of racing between pilots; (*b*) a term meaning the changing of pilots at certain specified intervals; (*c*) a magnetic switch.

16. Trim — (*a*) the streamline fittings used on airplanes; (*b*) adjusting controls so the airplane is balanced; (*c*) setting the ailerons so the plane does not bounce.

17. Spar — (*a*) a principle spanwise transverse member of a wing structure; (*b*) a long, rigid bar used to tie seaplanes to a buoy; (c) a strut used to brace the wing to the fuselage.

18. Stall — (*a*) the place seaplanes are anchored; (*b*) term used for a three-point landing; (*c*) loss of flying speed.

19. Reconnaissance — (*a*) an examination of a geographical region; (*b*) a type plane used to train new pilots; (*c*) term used when testing an overhauled plane or engine.

20. Fore — (*a*) used by pilot to indicate he is making a forced landing; (*b*) a wooden block over which sheet metal is formed; (*c*) forward or front of any designated position.

II. In the blank beside each number write the appropriate letter from the columns below.

1. . .The height of the airplane above the ground directly under it
2. . .An instrument used to determine weight and density of air or gases
3. . .A partition or closed frame in a struc-

(Continued on page 50A)

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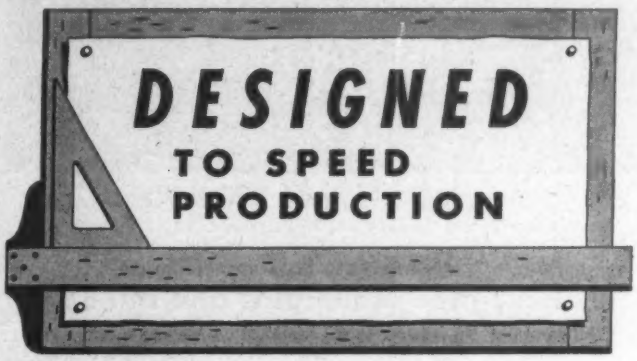

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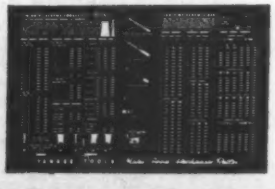

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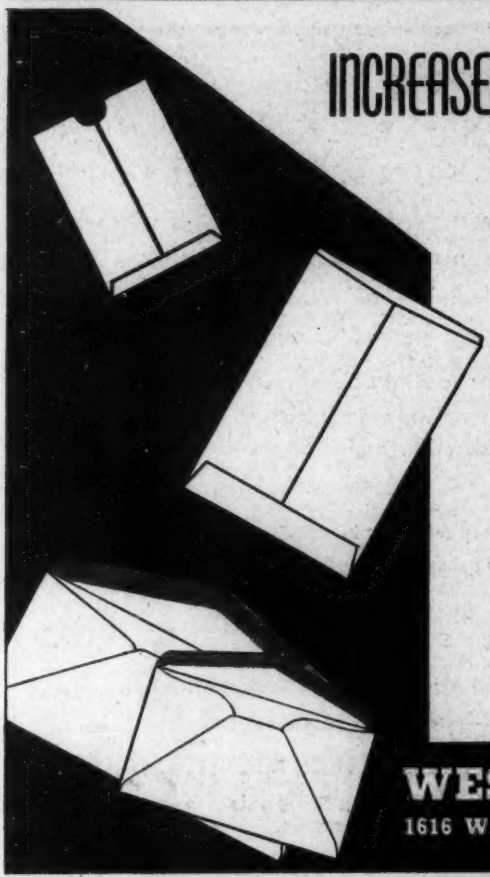

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(Continued from page 46A)

ture separating one portion from another

4. . .The longitudinal dimension of an airfoil section
5. . . .An instrument which detects and measures electric current by means of magnetic effects
6. . .The science having to do with the flow of liquids
7. . .Running an engine at low R.P.M.'s and under no load
8. . .A mechanical device for converting electrical energy into mechanical energy
9. . .A machine which produces power to do work
10. . .An instrument which registers the revolutions per minute of an engine

A. Chord
B. Idle
C. Engine
D. Absolute altitude
E. Bulkhead
F. Aerometer
G. Hydraulics
H. Tachometer
I. Motor
J. Galvanometer

III. Write in the words or word that makes each sentence true.

1. The pilot's control of the engine is the . . . . . .
2. An angular motion about the vertical axis of an aircraft is called. . . . . .
3. Thrust is the . . . . . force or pull which a propeller exerts.
4. The primary function of the stabilizer is to increase the . . . . . of an aircraft.
5. . . . . is the removable metal covering which goes around airplane engines.
6. When an engine is running at its lowest possible speed without stopping it is said to be . . . . . .
7. Pressure measuring instruments are called . . . . . .
8. The abbreviation p.s.i. stands for . . . . . .
9. In some cases of . . . . . the engine will continue to operate for sometime after the ignition switch is turned off.
10. A circuit breaker automatically opens a circuit in case of . . . . . .

KEY — PART I

1. (c)	5. (b)	9. (c)	13. (a)	17. (a)
2. (b)	6. (a)	10. (a)	14. (b)	18. (c)
3. (b)	7. (a)	11. (a)	15. (c)	19. (a)
4. (c)	8. (c)	12. (c)	16. (b)	20. (c)

KEY — PART II

1. D	3. E	5. J	7. B	9. C
2. F	4. A	6. G	8. I	10. H

KEY — PART III

1. throttle
2. yaw
3. forward
4. stability
5. Cowling
6. idling
7. gauges
8. pounds per square inch
9. preignition
10. overload

CORROSION PREVENTION IN AIRCRAFT ENGINES

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Now that many high schools have acquired or are planning to get one or more aircraft engines for their aeronautics or aircraft mechanics courses, it is vitally important that the instructor responsible for the care of this equipment be familiar with the causes of engine corrosion and the method of prevention.

Corrosion within an aircraft engine takes place, to a great degree, during periods of idleness, especially when fuels containing ethyl have been used. Ethylized fuels contain tetraethyl lead, ethylene diobromide, and red or green amiline dye.

During the combustion process within the cylinder, hydrogen-bromide gas is formed. During periods of idleness, the moisture which collects within the cylinders unites with the hydrogen-bromide gas to form hydro-bromic acid. It is this acid which attacks such metal parts as valves, pistons, cylinder heads, impellor wheels, and housing.

Anticorrosion treatments are of three types, depending on the length of time the engine will be in storage. The first type, which is called *short-storage treatment*, will adequately protect an engine to be idle for one to seven days. The second type of treatment will protect an idle engine for seven to thirty days. The third will protect the school engine which is to be idle for more than 30 days.

Protection for one to seven days. The aircraft engine can be protected during this period by pulling the propellor through several revolutions several times on the first day of idleness. On the second day, the engine is started, and operated at idling speeds until the oil and cylinder temperatures are normal. This alternate procedure of pulling the propellor through one day, and then running the engine on the next, is continued throughout the seven-day period.

Anticorrosion treatment for seven to thirty

(Continued on page 55A)

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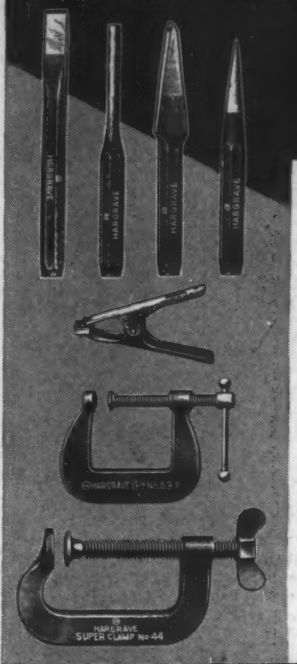

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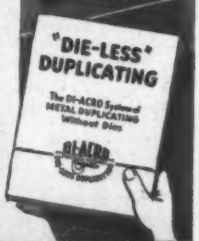

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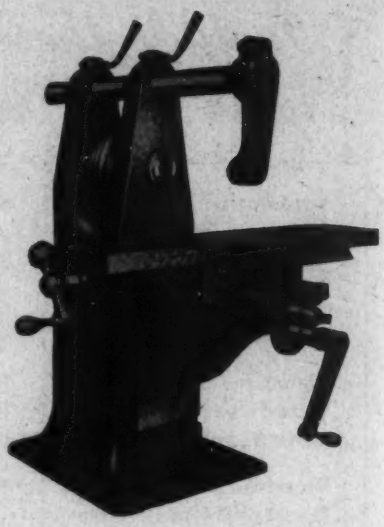

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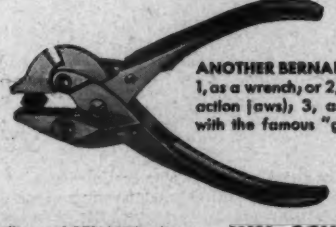

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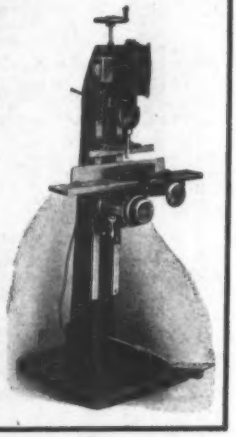

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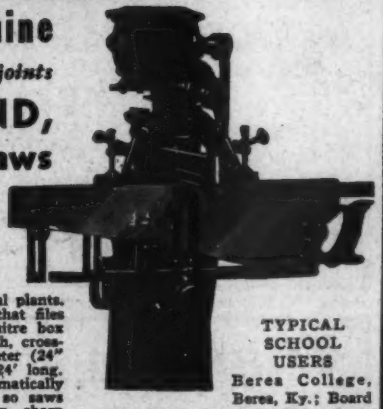

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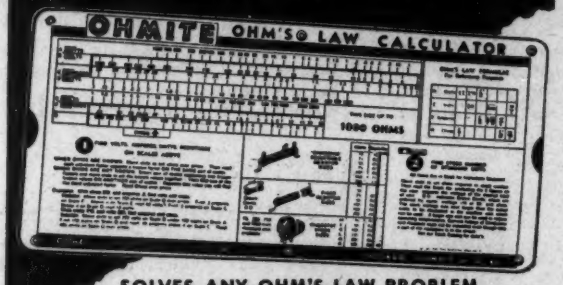

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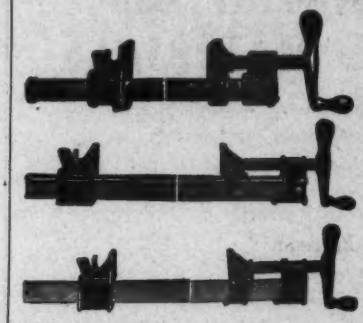

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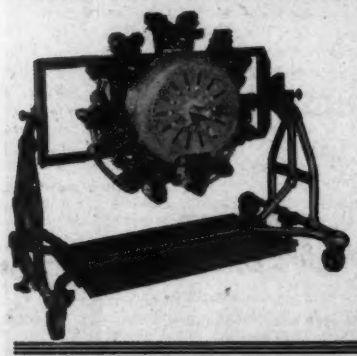

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(Continued from page 50A)

days. The treatment for this storage period consists of coating the surfaces of the valves and mechanism, combustion chambers, cylinder walls, pistonheads, induction manifold, and impellor section with standard corrosion preventative compound.

Spray the compound either through the exhaust valve ports or spark-plug openings of each cylinder. The propellor should be rotated several times to insure complete coverage of all working surfaces. Standard dehydrator plugs should be installed in the spark-plug openings.

The rocker-box covers on radial engines, and the camshaft covers on in-line, V-type engines should be removed, and the entire valve mechanism sprayed. On older types of radials where automatic valve lubrication is not used, the mechanism should be service lubricated as usual after being sprayed.

The sump drain plugs should be removed and the oil allowed to drain out. Standard dehydrator plugs should be installed in place of the sump plugs.

Silica-gel bags should be fastened in the exhaust-ring outlet, and the carburetor inlet and the openings sealed with a material such as plywood.

Corrosion treatment for more than thirty days of engine idleness. When the engine is to be out of service for 30 days or more, the following shutdown procedure should be used. Run the engine for the last 30 minutes on unleaded white gasoline having an octane rating of about 70. During the last part of the run, allow one quart of corrosion preventative compound to be admitted into the induction system. This is accomplished by spraying the preventative fluid into the induction system as close as possible to the throttle butterfly valve. The engine speed should be just high enough to prevent stalling.

While the engine is still warm, remove the sump drain plugs, allow oil to drain, and then install dehydrator plugs. All oil screens are removed, cleaned with gasoline, and treated with corrosion preventative compound. The oil screen chamber is sprayed, and the screen reinstalled.

If the engine is a liquid-cooled in-line type, drain all the coolant, and introduce compressed air into the cooling system to dry it.

Each cylinder, and the valve mechanism is treated as for the seven to thirty-day period.

Silica-gel bags should be installed in the intake and exhaust manifolds.

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Then the engine thrust bearing is sprayed through the cover-plate opening, and the cover reinstalled.

The fuel and vacuum pumps are treated with engine oil admitted into the inlet ports while rotating the propellor.

The carburetor float chamber should be filled through the inlet connection with engine lubricating oil. The throttle and mixture controls should be worked several times to force the oil through the accelerating pump and mixture systems. Remove the drain plugs from the float chamber and main metering jet. Allow to drain and reinstall plugs. The fuel lines should be left disconnected, and the ports sealed with neoprene rubber plugs.

(Continued on page 57A)

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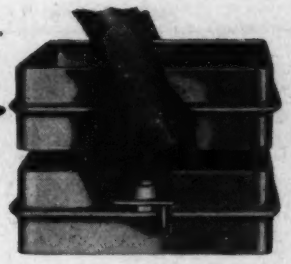

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(Continued from page 55A)

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By Herbert Bast. Cloth, 301 pp., 5½ by 7⅞ in., illus., $2.75. The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis.

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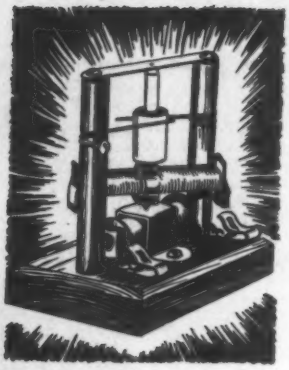

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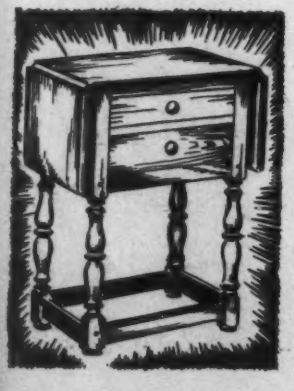

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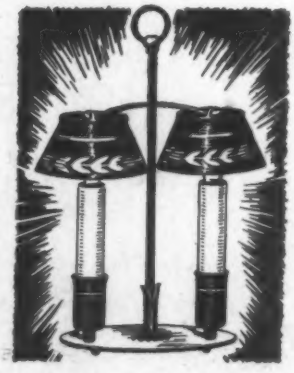

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